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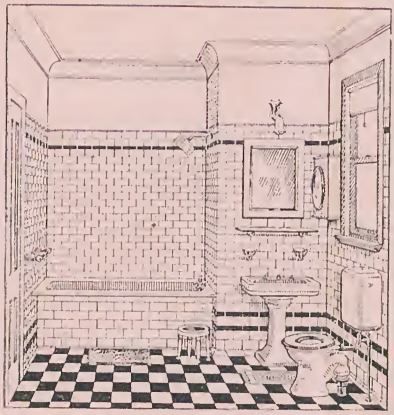

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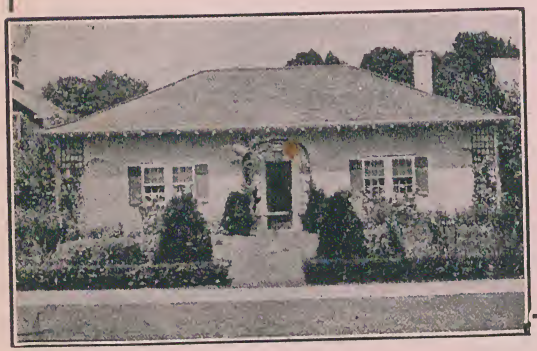

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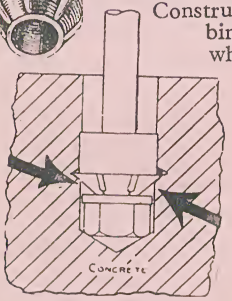

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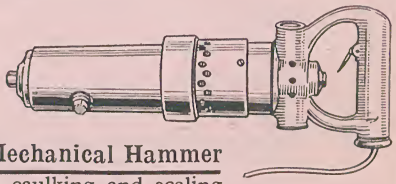

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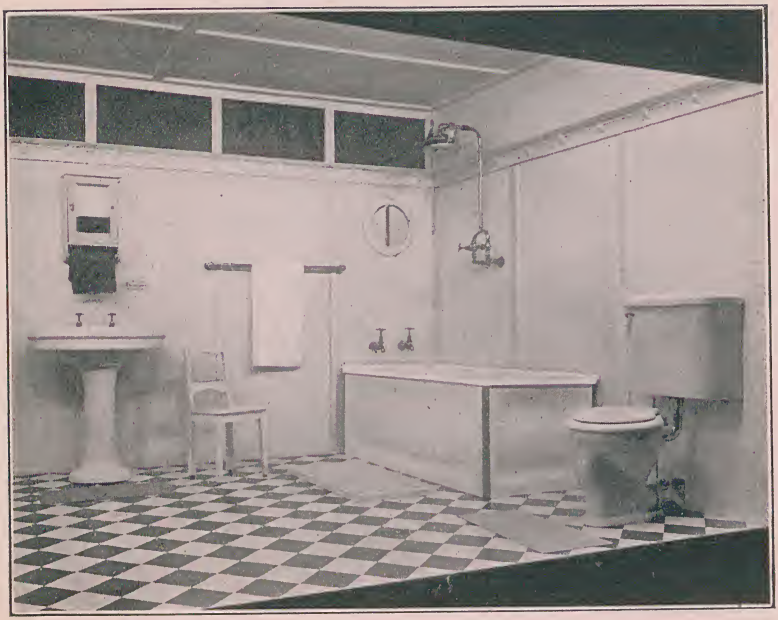

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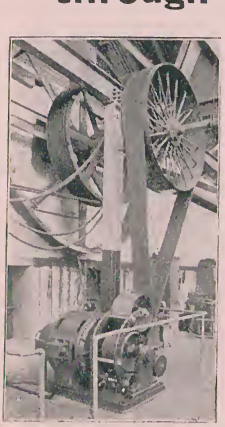

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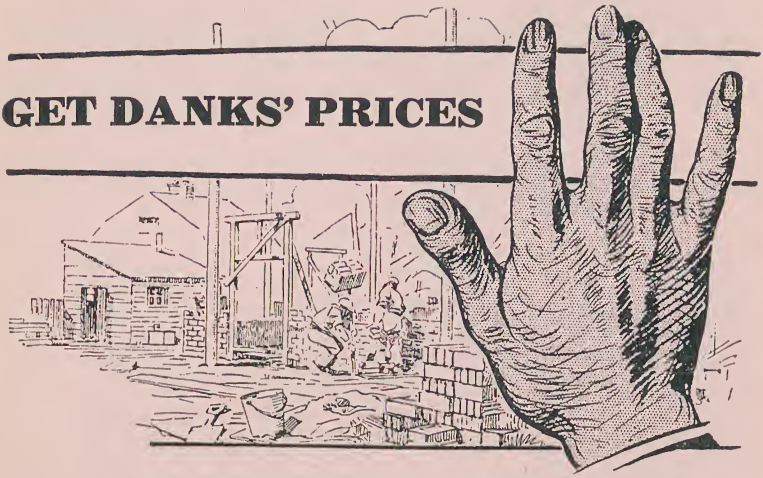

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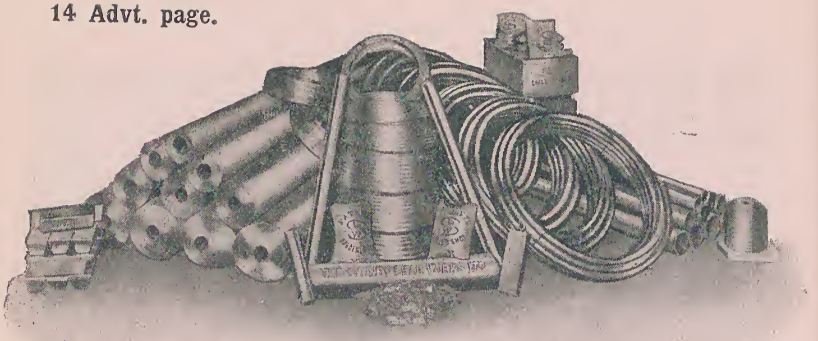

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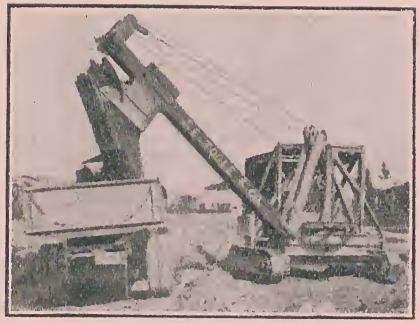

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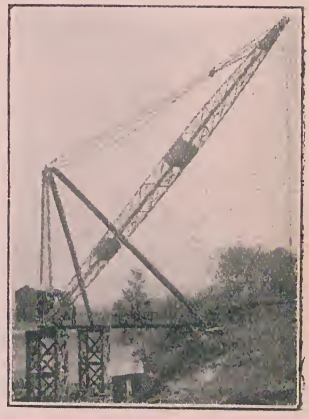

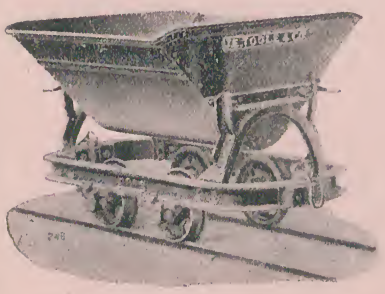

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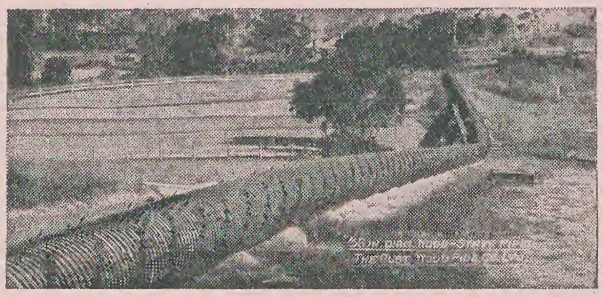

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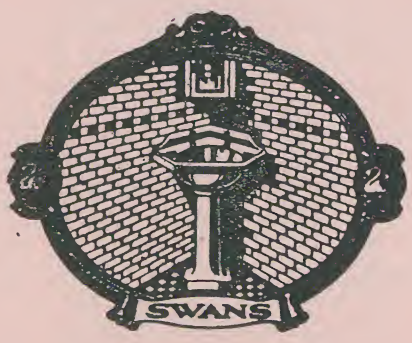

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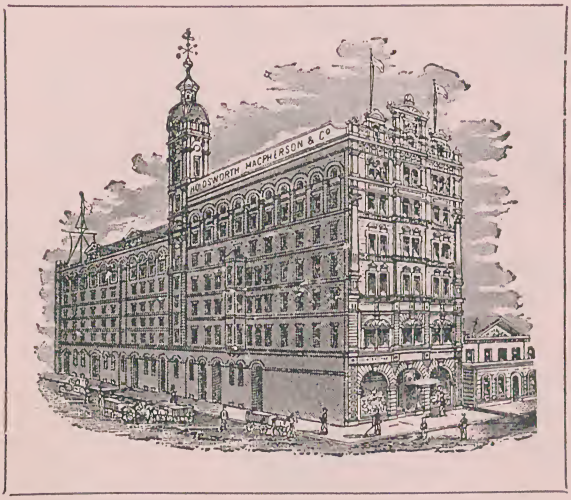

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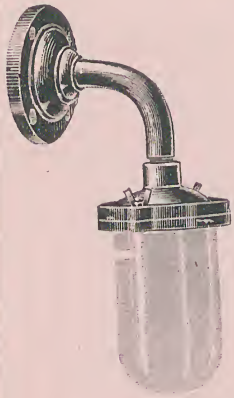

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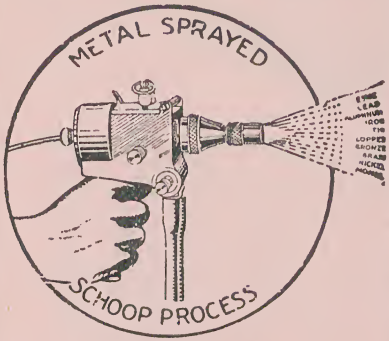

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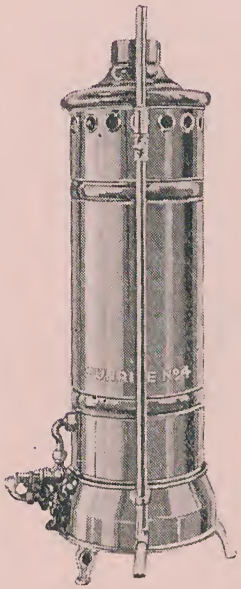

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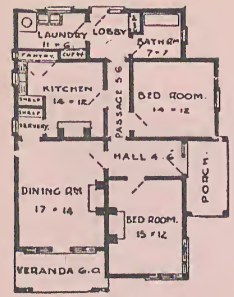

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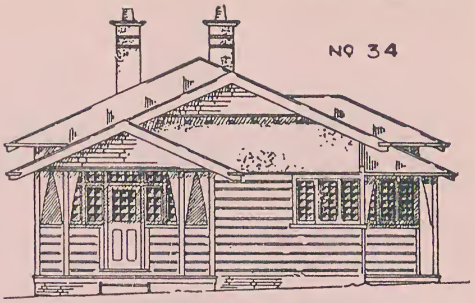

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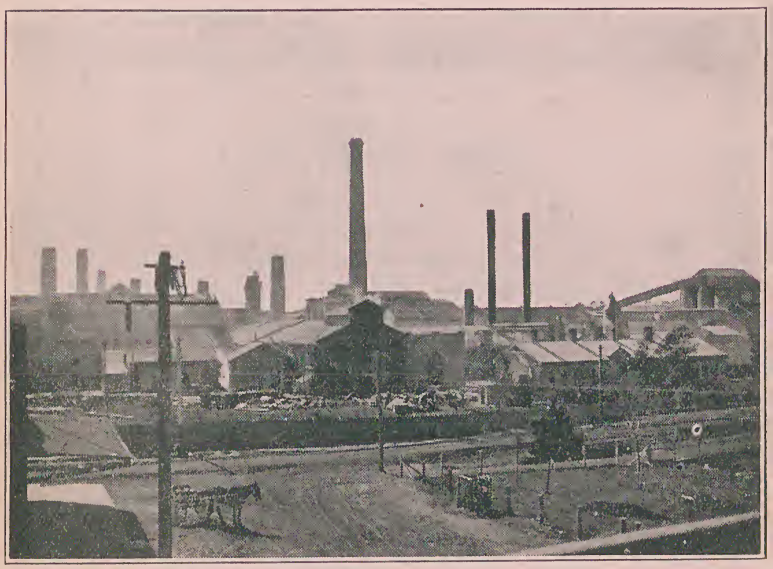

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PREFACE.

In reconstructing this, the **Ninth Edition**, of "Mayes' Australian Builders and Contractors' Price Book," the change since the last edition (13 years ago) has been so drastic from the old to the modern machine methods and new forms of construction with the consequent higher efficiency, intelligence, and value of the human element necessary, that absolutely a new book has now been compiled, with special tables and data for **guidance in reckoning** the costs. I am indebted to the City Council of Sydney for their valuable **Constants of Labour Table**, calculated from the average time taken in stated work actually done.

Also the cost and maintenance of all kinds of municipal roads and pavements from above proved data. The sets of new tables, carefully worked out and checked, including those specially compiled on concrete reinforcement by Malcolm S. Stanley, C.E., together with mathematically designed graphs, will also save time in estimating.

The prices of labour are reckoned at the current rate of wages stated under each trade. **If wages or materials alter in prices, add or deduct.**

The prices of plant and tools used by various contractors, as well as those in the building trade, will be a useful reference ; also the illustrations will help considerably.

Legal notes relating to Australian Contracts, employers, architects' agreements, and building generally, revised expressly for this work, will, I feel sure, be found useful to my readers.

The Schedule of Builders' prices under different trade headings, calculated on the current rates of labour and material, are given as a guide only.

Fixed prices with similar profit adapted to all circumstances are impossibilities.

The **cost** prices under favourable circumstances are therefore given, leaving to the contractor to add what he considers a fair allowance for incidental expenses and for profit as the locality and circumstances warrant.

Any reference made to names of agents, manufacturers, or brands is only for the convenience of contractors, and not **intended to advertise any particular kind or description of building material or contractors' plant.** For detailed prices of timber and mill joinery, *see* published monthly lists.

The **chief** value of a price book is as a book of **reference**, where the average or standard prices obtainable can be **ascertained** and is thus both a **guide** to and also a check upon contractors' own current prices and methods.

In revising this work the most reliable standard authorities have been consulted, and every means has been taken to secure accuracy.

The Author will be pleased if his readers will make any suggestions for the work to make it more useful and complete, and to benefit those for whom it is published.

In conclusion, I have to thank those who have rendered me valuable assistance in preparing this work.

Neutral Bay,
Sydney, 1927.

C. ERNEST MAYES.

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QUANTITIES AND MEASUREMENTS.

In addition to the rules for measurements given under the various trades, the following mems. will be found useful.

Adhere as much as possible to one system and routine of measurement, following the order pursued by the builder, &c., in actual construction.

In taking dimensions, it will be found most convenient to work from left to right. In unusual designs, make sketch plans with dimensions.

In excavations, foundations, or walls of a building, take the back and front and parallel walls from out to out, and the other walls in the clear.

In scaling from a plan, when the dimensions are not given, apply the reading of the scale at the end of the first dimension to the commencement of the second dimension; repeating the operation until the scale is exhausted or the end of the scale is reached; note these accumulated dimensions, and repeat the process until the whole of the walls required are measured.

The measurement of the length of foundation walls will be a check on the measurement of the walls forming the superstructure. These lengths can be taken for the trenches in excavation, allowing about 12 inches in the widths to enable tradesmen to work.

As the excavation, levelling and stepping of trenches, with part refilled and rammed, are worth double or treble ordinary excavation, they must be kept separate.

Rock excavation should be reckoned by the cube yard with the stepping and levelling by the foot super.

Chimney breasts, including fireplaces, are generally reckoned solid, allow for arch separately, when the fireplace opening is deducted.

Cornices, strings, &c., are reckoned solid, the length, breadth and depth being taken.

Ovens, coppers and furnaces are reckoned solid by the cube yard.

Facings, pointing, &c., by the yard super or square of 100 sup. feet.

Gauged arches, cuttings, &c., by the foot super.

Openings.—The width is always given first and then the height; **daylight**, or the size of opening in wall being included.

If the head is curved, the height from the stone or brick sill to the centre of soffit is implied, unless stated otherwise.

Flooring may include joists, at per square, or the joists may be taken at per hundred lineal feet, stating the scantling. If the flooring is taken net, it will form with the hearths and chimney breasts a check for the plastering or lining of ceilings, after deducting well-holes of stairs, &c. If the net measurement is taken for flooring, an addition must be made to the price to allow for loss of width by tongueing and grooving, besides short lengths and remnants too short to work in. This, with 6 x 1 T. and G. flooring, would be about ten per cent.

Chimney breasts or flues are not deducted in measuring ceilings.

The lineal measurement of facia next eaves will also give the length of eaves for slating, and the length of eaves spouting, with one foot added for each angle. The soffit, if more than 11in. wide, should be reckoned by the foot super.

Bracketing, per super foot.—Take lengths of walls by the girth of brackets.

Ribbed and other centreing, per foot super, and supports added.

Joinery is reckoned by the foot super, or lineal foot, as given under the various headings.

BUILDERS' PRICES are usually made up of material, labor, cartage, scaffolding, waste and profit.

The cost of each varies from time to time, the site and weather have to be considered, so there could not possibly be fixed prices; add 5 per cent. for established charges; 5 per cent. depreciation of plant; 10 per cent. profit for jobs from £500 up to £1000.

All kinds of work, if done in small quantities, are worth from 30 to 50 per cent. more than that in large areas and quantities.

Also, the smaller the area and more confined the space for workmen, and cramped handling of materials are important items governing cost.

Also **repetition** work in larger structures, such as **concrete moulds or forms, falence** or **facing work,** sameness of openings and fittings.

ANOTHER CONTRACTOR'S METHOD to save labor in estimating is to concentrate measurements of buildings into as few items as possible, making a **schedule** of grouped prices for different qualities of the work, allowing for the usual openings.

Walls of brickwork by the 1,000 bricks contained, reckoning 9 bricks to the square foot of finished brick work.

Plastering, or **covering facings** to external and internal walls, at per 100 square feet, or the square yard.

Flooring, including joists, plates, different kinds of scantling, at per square.

Roofing material, including rafters, timbers, and scantling, sometimes slates, tiles or iron, and added at per square.

Ceilings, including joists, at per square; cornices and picture rail can be added after.

Verandahs, including paving, plates, posts, woodwork, per foot run, according to width.

Foundations, bay windows, porches, reckoned according to detail. detail.

Usual door and window openings, including architraves, complete, fitted with ordinary doors, furniture, glazing, at per opening, or superficial foot. This method is also approximate, and requires judgment in its application.

REMEMBER!
FIXED PRICES
WITH SIMILAR PROFIT
ADAPTED TO ALL CIRCUMSTANCES
ARE IMPOSSIBILITIES.

GENERAL DEDUCTIONS ON COST.

The carcass of a building costs about 2/3rds. of the work finished.

For forming site (re-forming roads cut up), fences, drainage and water supply, add about 8 per cent. on to cost of ordinary house or cottage.

Brick buildings cost 10 to 20 per cent. less than stone ones.

Wooden buildings 30 to 50 per cent. less than stone.

Concrete blocks, 20 to 35 per cent. less than stone.

The Repairs or upkeep of a dwelling building: After the first year reckon 1 per cent. on prime cost; after the tenth year, 2 to 3 per cent. of cost.

Standard prices of materials and labor are given throughout. If any increase or decrease occur at any time, ascertain the percentage and add or deduct.

WEIGHT OF BUILDING MATERIALS

Stone, &c.

Australian	Per Cubic foot lbs.	cubic feet per ton
Oamaru, Typo, Waurn Ponds and Geelong freestones	134	16½
Kyneton sandstone	138	16¼
Western Port do. ...	148	15½
Spring Bay ditto ...	140	16
Pt. Ventenet do. ...	145	15½
Grampian sandstone ...		14½
Sydney sandstone ...	140	16
Bluestone (basalt) ...	161	14
Granite, grey or red	167	13½
Marble, Adelaide ...	169	13¼
Brickwork, dry, about	124	18
Sand (sharp), about	95	23
Clay, mild earth ...	120	17
Clay, strong and stiff	135	16½
Mortar, dry	93	24

Australian Facings.

In.		Ft. sup. p. ton
4	Sydney sandstone ...	48
3	Sawn bluestone	84
2½	thick Ditto, ...	70
2	thick Ditto, ...	56
1	Slate, Welch	160
1½	Ditto	107
1	Marble slabs, black ...	165
1	Do., white or veined	160

Granite, Aberdeen	...	116	13⅞
Marble, Carrara	...	170	13¼
Cast Iron ...	...	464	4.83
Wrought Iron	...	477	4.70

Timber.

Imported	Per Cubic foot lbs.	cubic feet per ton
Red or White American pine (seasoned)	34	66
Yellow pine, Baltic (seasoned) ...	35	64
Red pine, Riga ditto	33	62
Pitch pine (seasoned)	39	57½
Cedar, Spanish American (seasoned) ...	30	75
Mahogany, Spanish	66	34
Mahogany, Honduras, or Baywood ...	40	56
Oak, just felled ...	68	33
Oak, of commerce ...	57½	39
Oak, well seasoned ...	48	47
Elm, just felled ...	58	38
Elm, well seasoned ...	42	53
Teak, Indian, do. ...	42	53
Ebony	80	28
Australian.		
Cedar, N.S.W. ...	36	62
Kauri, New Zealand	40	56
Hardwood, about ...	56	40
Iron bark and box, just felled	70	32
Blue or red gum, ditto	65	34½
Stringy bark and Blackwood, do. ...	64	35
The 4 H.-woods average	60	37½
Jarrah	51	44
Maple, American ...	47	48
Maple, Queensland ...	48	47
Walnut, black ...	60	37
Walnut, Tasmanian	56	40

See also Index.

WEIGHT OF BUILDING MATERIALS.

ROOFING, *per square.*	cwt.
Slates, 4in. lap ...	6
Palings, half, 5 or 6ft.	3 to 4
Shingles	2½ to 3
Zinc, plain, 8 to 12 gauge	⅝ to 1¼
Gal. Iron, 26 and 24 gauges, lapped 2 corrugations ...	1 to 1½

Lead—add 00 to the lbs. per foot for the lbs. per square (that is, multiply by 100) and allow for laps.

The rolls are generally 30 ft. by 7 ft. wide.

FLOORS, *per square.*	cwt.
1in. T. and G. American red or white pine	2
1 1/8in. wrought Baltic red pine ...	2 1/3
1in. ditto, pitch pine	2⅛
1in. Colonial Pine, T. & G.	2½
1in. Oregon, T. & G....	2½
⅞in. Oregon, T. & G....	2¼
1in. Hardwood, T. & G.	6
¼in. Firsts, T. & G. ...	5

GLAZED LEAD LIGHT.

3 lbs. per sq. ft. average.

Sheet glass, per 16oz. to 21oz. and per foot Plate glass.

FLOORS SHOULD BE MADE TO SUPPORT PER SQ. FT.

	cwt.
Private or ordinary rooms, etc.	from 1 to 2
Public Rooms for meetings, halls, theatres, etc., per square ft. ...	2½
Warehouses or stores, railway or wharf platforms, road bridges	3
Railway bridges or viaducts	5

METALS, *per cubic inch.*	lbs.
Iron bar	0.279
Iron or tin, cast ...	0.263
Steel, hard	0.283
Lead	0.411
Copper, cast ...	0.318
Brass, cast	0.304
Zinc, cast	0.26
Gun metal	0.31

LIME, CEMENT, &c.

	lbs.
Lime, heads, p. bag, 3 bus.	180
Do. Geelong roche do.	200
Cement, Portland, p. cask of 3½ bushels	400
Plaster of Paris, p. ck. 3½ bushels ...	310

CEMENT AND CONCRETE AGGREGATES, *average per cubic ft.*

	lbs.
Coke, breeze ...	37
Clinker	80
Brick, broken ...	120
Sandstone, broken ...	140
Bluestone basalt ...	160

BRICKS, *per cubic foot.*

Black or red ...	131
Sydney machine (commons)	101
Hand Made Sandstock (commons)	84

Concrete Material.

Cement, Portland	...	87 26
Cinders, clean	...	60 37
Coke, ordinary	...	46 49
Coke, breeze	...	37 60½

WATER, *rain or pure, at* 63 deg.

62½ lbs. or 6¼ gallons, one cubic foot.

10 lbs., or 277¼ c. ins., one gallon.

35.85 c. ft., or 224 gallons, one ton.

8 gallons or 1 ft. 3½-12ths cube, one bushel.

1 bushel, 1.28 c. ft.

1 bushel, 1.28 c. ft. or 2 of 4 gall. kerosene tins, = ½ bushel each tin.

See also Index.

CIRCUMFERENCES AND AREAS OF CIRCLES.

for either inches, feet, yards, links or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
			9	28.27	63.62	18	56.55	254.47
¼	0.785	.049	¼	29.06	67.20	¼	57.33	261.52
½	1.571	.196	½	29.84	70.88	½	58.12	268.80
¾	2.356	.442	¾	30.63	74.66	¾	58.91	276.12
1	3.142	.785	10	31.42	78.54	19	59.69	283.53
¼	3.927	1.227	¼	32.20	82.52	¼	60.47	291.04
½	4.712	1.767	½	32.99	86.59	½	61.26	298.65
¾	5.498	2.405	¾	33.77	90.76	¾	62.05	306.35
2	6.283	3.142	11	34.56	95.03	20	62.83	314.16
¼	7.069	3.976	¼	35.34	99.40	¼	63.62	322.06
½	7.854	4.909	½	36.13	103.87	½	64.40	330.06
¾	8.639	5.939	¾	36.91	108.43	¾	65.19	338,16
3	9.425	7.068	12	37.70	113.10	21	65.79	346.36
¼	10.210	8.296	¼	38.48	117.86	¼	66.76	354.66
½	10.995	9.621	½	39.27	122,72	½	67.54	363.05
¾	11.781	11.044	¾	40.05	127.68	¾	68.33	371.54
4	12.566	12.566	13	40.84	132.73	22	69.11	380.13
¼	13.351	14.186	¼	41.63	137.89	¼	69.90	388.82
½	14.137	15.904	½	42.41	143.14	½	70.69	397.61
¾	14.922	17.720	¾	43.20	148.49	¾	71.47	406.49
5	15.71	19.63	14	43.98	153.94	23	72.26	415.48
¼	16.49	21.65	¼	44.77	159.48	¼	73.04	424.56
½	17.28	23.76	½	45.55	165.13	½	73.83	433.73
¾	18.06	25.97	¾	46.34	170.87	¾	74.61	443.01
6	18.85	28.27	15	47.12	176.71	24	75.40	452.39
¼	19.63	30.68	¼	47.91	182.65	¼	76.18	461.86
½	20.42	33.18	½	48.69	188.69	½	76.97	471.44
¾	21.20	35.78	¾	49.48	194.83	¾	77.75	481.11
7	21.99	38.48	16	50.26	201.06	25	78.54	490.87
¼	22.78	41.28	¼	51.05	207.39	¼	79.32	500.74
½	23.56	44.18	½	51.84	213.82	½	80.11	510.71
¾	24.35	47.17	¾	52.62	220.35	¾	80.90	520.77
8	25.13	50.26	17	53.41	226.98	26	81.68	530.93
¼	25.92	53.46	¼	54.19	233.70	¼	82.47	541.19
½	26.70	56.74	½	54.98	240.53	½	83.25	551.55
¾	27.49	60.13	¾	55.76	247.45	¾	84.04	562.00

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES,

for either inches, feet, yards, links, or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
27	84.82	572.56	36	113.10	1017.9	45	141 .37	1590.4
¼	85.61	583.21	¼	113.88	1032.1	¼	142.16	1608.2
½	86.39	593.96	½	114.67	1046.4	½	142.94	1626.0
¾	87.18	604.81	¾	115.45	1060.7	¾	143.73	1643.9
28	87.96	615.75	37	116.24	1075.2	46	144.51	1661.9
¼	88.75	626.80	¼	117.02	1089.8	¼	145.03	1680.0
½	89.53	637.94	½	117.81	1104.5	½	146.08	1698.2
¾	90.32	649.18	¾	118.59	1119.2	¾	146.87	1716.5
29	91.11	660.52	38	119.38	1134.1	47	147.66	1734.9
¼	91.89	671.96	¼	120.17	1149.1	¼	148.44	1753.5
½	92.68	683.49	½	120.95	1164.1	½	149.23	1772.1
¾	93.46	695.13	¾	121.74	1179.3	¾	150.01	1790.8
30	94.25	706.86	39	122.52	1194.6	48	150.80	1809.6
¼	95.03	718.69	¼	123.31	1209.9	¼	151.58	1828.5
½	95.82	730.62	½	124.09	1225.4	½	153.37	1847.5
¾	96.60	742.64	¾	124.88	1241.0	¾	153.15	1868.6
31	97.39	754.77	40	125.66	1256.6	49	153.94	1885.7
¼	98.17	766.99	¼	126.45	1272.4	¼	154.72	1905.0
½	98.97	779.31	½	127.23	1288.2	½	155.51	1924.4
¾	99.75	791.73	¾	128.02	1304.2	¾	156.29	1943.9
32	100.53	804.25	41	128.81	1320.3	50	157.08	1963.5
¼	101.32	816.86	¼	129.59	1336.4	¼	157.87	1983.2
½	102.10	829.58	½	130.38	1352.6	½	158.65	2003.0
¾	102.89	842.39	¾	131.16	1369.0	¾	159.44	2022.8
33	103.67	855.30	42	131.95	1385.4	51	160.22	2042.8
¼	104.46	868.30	¼	132.73	1402.0	¼	161.01	2062.9
½	105.24	881.41	½	133.52	1418.6	½	161.79	2083.1
¾	106.03	894.61	¾	134.30	1435.4	¾	162.58	2103.4
34	106.81	907.92	43	135.09	1452.2	52	163.36	2123.7
¼	107.60	921.32	¼	135.87	1469.1	¼	164.15	2144.2
½	108.38	934.82	½	136.66	1486.2	½	164.93	2164.8
¾	109.17	948.41	¾	137.45	1503.3	¾	165.72	2185.4
35	109.96	962.11	44	138.23	1520.5	53	160.50	2206.2
¼	110.74	975.90	¼	139.02	1537.8	¼	167.29	2227.1
½	111.53	989.80	½	139.80	1555.3	½	168.08	2248.0
¾	112.31	1003.7	¾	140.59	1572.8	¾	168.86	2269.1

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES,

for either inches, feet, yards, links, or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
54	169.65	2290.2	63	197.92	3117.3	72	226.20	4071.5
¼	170.43	2311.5	¼	198.71	3142.0	¼	226.98	4099.8
½	171.22	2332.8	½	199.49	3166.9	½	227.77	4128.3
¾	172.00	2354.3	¾	200.28	3191.9	¾	228.55	4156.8
55	172.70	2375.8	64	201.06	3217.0	73	229.34	4185.4
¼	173.57	2397.5	¼	201.85	3242.2	¼	230.12	4214.1
½	174.36	2419.2	½	202.63	3267.5	½	230.91	4242.9
¾	175.14	2441.1	¾	203.42	3292.8	¾	231.69	4271.8
56	175.93	2463.0	65	204.20	3318.3	74	232.48	4300.9
¼	176.72	2485.1	¼	204.99	3343.9	¼	233.26	4330.0
½	177.50	2507.2	½	205.77	3369.6	½	234.05	4359.2
¾	178.29	2529.4	¾	206.56	3395.3	¾	234.83	4388.5
57	179.07	2551.8	66	207.35	3421.2	75	235.62	4417.9
¼	179.86	2574.2	¼	208.13	3447.2	¼	236.41	4447.4
½	180.64	2596.7	½	208.92	3473.2	½	237.19	4477.0
¾	181.43	2619.4	¾	209.70	3499.3	¾	237.98	4506.7
58	182.21	2642.1	67	210.49	3525.7	76	238.76	4536.5
¼	183.00	2664.9	¼	211.27	3552.0	¼	239.55	4566.4
½	183.78	2687.8	½	212.06	3578.5	½	240.33	4596.4
¾	184.57	2710.9	¾	212.84	3605.0	¾	241.12	4626.4
59	185.35	2734.0	68	213.63	3631.7	77	241.90	4656.6
¼	186.14	2757.2	¼	214.41	3658.4	¼	242.69	4686.9
½	186.93	2780.5	½	215.20	3685.3	½	243.47	4717.3
¾	187.71	2803.9	¾	215.99	3712.2	¾	244.26	4747.8
60	188.50	2827.4	69	216.77	3739.3	78	245.04	4778.4
¼	189.28	2851.1	¼	217.56	3766.4	¼	245.83	4809.1
½	190.06	2874.8	½	218.34	3793.7	½	246.62	4839.8
¾	190.85	2898.6	¾	219.13	3821.0	¾	247.40	4870.7
61	191.64	2922.5	70	219.91	3848.5	79	248.19	4901.7
¼	192.42	2946.5	¼	220.70	3876.0	¼	248.97	4932.8
½	193.21	2970.6	½	221.48	3903.6	½	249.76	4963.9
¾	193.99	2994.8	¾	222.27	3931.4	¾	250.54	4995.2
62	194.78	3019.1	71	223.05	3959.2	80	251.33	5026.6
¼	195.56	3043.5	¼	223.84	3987.1	¼	252.11	5058.1
½	196.35	3068.0	½	224.62	4015.2	½	252.90	5089.6
¾	197.14	3092.6	¾	225.41	4043.3	¾	253.67	5121.2

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES,

for either inches, feet, yards, links, or chains.

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
81	254.47	5153.0	87	273.32	5944.7	93	292.17	6792.9
½	256.04	5216.8	½	274.89	6013.2	½	293.74	6866.2
82	257.61	5281.0	88	276.46	6082.1	94	295.31	6939.8
½	259.18	5345.6	½	278.03	6151.4	½	296.88	7013.8
83	260.75	5410.6	89	279.60	6221.2	95	298.45	7088.2
½	262.32	5476.0	½	281.17	6291.3	½	300.02	7163.0
84	263.89	5541.8	90	282.74	6361.7	96	301.50	7238.2
½	265.47	5608.0	½	284.31	6432.6	½	303.16	7313.6
85	267.04	5674.5	91	285.89	6503.9	97	304.65	7389.8
½	268.61	5741.5	½	287.46	6573.6	98	307.84	7542.9
86	270.18	5808.8	92	289.03	6647.6	99	311.00	7697.7
½	271.75	5876.6	½	290.60	6720.1	100	314.16	7854.0

CIRCUMFERENCES.—If the diam. is between 100 and 200, call the radius the diam. and double the given circumference. If between 200 and 300, enter the Table with one-third the diam., and multiply the given circumference by 3. If between 300 and 400, or 400 and 500, enter the Table with one-fourth or one-fifth, and multiply by 4 or 5, and so on for any number, taking care to multiply the given circumference by the same figure that you divided the diam. by.

EXAMPLE.—Required the circumference of a circle whose diam. is 152.—Enter the Table with the radius 76, the circumference given is 238.76 and 238.76 x 2 = 477.52, the circumference required.

AREAS.—If the diam. is more than 100, enter the Table with one-half or one-third, &c., as above, and multiply the area given by (4, or 9, &c.), the *square* of the figure you divided the diam. by.

EXAMPLE.—Required the area of the circle given in the last example. Opposite to 76 the area given is 4536.5 and 4536.5 x 4 [2 x 2] = 18146.0, the area required.

CAPACITY.—The given or ascertained areas in inches, multiplied by 0.0443, or the areas in feet multiplied by 6.23, will give the number of gallons equal to the area, by one foot in depth.

EXAMPLE.—Required the contents per lineal foot of a 15in. pipe. The area given is 176.71 and 176.71 x 0433 = 7.65 gallons. See p. 16. The contents per foot in depth of a tank 12ft. diam. will be = 113.10 x 62.3 = 704.6 gallons.

SQUARES OF NUMBERS ADVANCING BY $\frac{1}{8}$ths

M. S. Stanley, A.M.I.E.A.

No.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0		.0156	.0625	.1406	.2500	.3906	.5625	.7656
1	1	1.2656	1.5625	1.8906	2.2500	2.6406	3.0625	3.5156
2	4	4.5156	5.0625	5.6406	6.2500	6.8906	7.5625	8.2656
3	9	9.7656	10.5625	11.3906	12.2500	13.1406	14.0625	15.0156
4	16	17.0156	18.0625	19.1406	20.2500	21.3906	22.5625	23.7656
5	25	26.2656	27.5625	28.8906	30.2500	31.6406	33.0625	34.5156
6	36	37.5156	39.0625	40.6406	42.2500	43.8906	45.5625	47.2656
7	49	50.7656	52.5625	54.3906	56.2500	58.1406	60.0625	62.0156
8	64	66.0156	68.0625	70.1406	72.2500	74.3906	76.5625	78.7656
9	81	83.2656	85.5625	87.8906	90.2500	92.6406	95.0625	97.5156
10	100	102.5156	105.0625	107.6406	110.2500	112.8906	115.5625	118.2656
11	121	123.7656	126.5625	129.3906	132.2500	135.1406	138.0625	141.0156
12	144	147.0156	150.0625	153.1406	156.2500	159.3906	162.5625	165.7656
13	169	172.2656	175.5625	178.8906	182.2500	185.6406	189.0625	192.5156
14	196	199.5156	203.0625	206.6406	210.2500	213.8906	217.5625	221.2656
15	225	228.7656	232.5625	236.3906	240.2500	244.1406	248.0625	252.0156
16	256	260.0156	264.0625	268.1406	272.2500	276.3906	280.5625	284.7656
17	289	293.2656	297.5625	301.8906	306.2500	310.6406	315.0625	319.5156
18	324	328.5156	333.0625	337.6406	342.2500	346.8906	351.5625	356.2656
19	361	365.7656	370.5625	375.3906	380.2500	385.1406	390.0625	395.0156
20	400	405.0156	410.0625	415.1406	420.2500	425.3906	430.5625	435.7656

The above table is read vertically and horizontally.
Thus, the square of $5\frac{1}{2} = 30.25$, or the square of $18\frac{7}{8} = 353.2656$.

CUBES OF NUMBERS ADVANCING BY $\frac{1}{8}$ths.

No.	0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
0		.002	.016	.053	.125	.244	.422	.670
1	1	1.424	1.953	2.600	3.375	4.291	5.359	6.592
2	8	9.596	11.391	13.396	15.625	18.088	20.797	23.764
3	27	30.518	34.328	38.443	42.875	47.635	53.734	58.186
4	64	70.189	76.766	83.740	91.125	98.932	107.172	115.857
5	125	134.611	44.703	155.287	166.375	177.979	190.109	202.779
6	216	229.783	244.141	259.084	274.065	290.775	307.547	324.951
7	343	361.705	381.078	401.131	421.875	443.322	465.484	488.373
8	512	536.377	561.516	587.428	614.125	641.619	669.922	699.045
9	729	759.799	791.453	823.975	857.375	891.666	926.859	962.967
10	1000	1037.971	1076.891	1116.771	1156.625	1199.463	1242.297	1286.139
11	1331	1376.893	1423.828	1471.818	1520.875	1571.010	1622.234	1674.561
12	1728	1782.564	1838.266	1895.115	1953.125	2012.307	2072.672	2134.232
13	2197	2260.986	2326.203	2392.662	2460.375	2529.354	2599.609	2671.154
14	2744	2818.158	2893.641	2970.459	3048.625	3128.150	3209.047	3291.326
15	3375	3460.080	3546.578	3634.506	3723.875	3814.697	3906.984	4000.748
16	4096	4192.752	4291.016	4390.803	4492.125	4594.994	4699.422	4805.420
17	4913	5022.174	5132.953	5245.350	5359.375	5475.041	5592.359	5711.342
18	5832	5954.346	6078.391	6204.146	6331.625	6460.838	6591.797	6724.514
19	6859	6995.268	7133.328	7273.193	7414.875	7558.385	7703.734	7850.936
20	8000	8150.939	8303.766	8458.490	8615.125	8773.682	8934.172	9096.607

The above table gives the cube of any number between $\frac{1}{8}$ and $20\frac{7}{8}$; that is to say, the cube of 10 is 1000, or the cube of $10\frac{5}{8}$ is 1199.463.

WEIGHTS OF MATERIALS AND METALS.

Weight in lbs. of one Cubic foot.

Asphalte	155lbs.	Coke	40lbs.
Common Earth	95 to 125lbs.	Emery	250lbs.
Clay	135lbs.	Flint	164lbs.
Limestone	140lbs.	Glass (plate)	169lbs.
Coal (Solid)	80lbs.	Terra Cotta (Solid)	122lbs.
Coal (Loose)	52lbs.	Tar, Raw	11.7lbs.
Tar (Distilled), No. 1	11.2lbs.	Tar (Distilled) No. 2	11.4lbs.

Per Gallon

METALS.

Milled Lead	711.5lbs.	Wrought Iron	480lbs.
Cast Lead	709lbs.	Tin	460lbs.
Copper	539.6lbs.	Cast Iron	450lbs.
Sheet Copper	548lbs.	Zinc	440lbs.
Drawn Copper	555lbs.	Bronze	512lbs.
Brass (Drawn)	524lbs.	Bell Metal	545lbs.
Steel	494lbs.		

THE NATURAL ANGLE OF REST FOR MATERIAL EXCAVATED.

Dry Sand, Sheltered	22 degrees	Clay	45 degrees
Wet Sand	38 „	Rubble or Mine Tips	45 „
Earth or Soil	30 „	River Shingle	40 „

BRICKS.—9in. x 4½in. x 3in., average 8.4lbs.
(Machine Commons), dry, 1000 = 8400lbs. = 75cwt.
1000 close stacked = 77 cubic feet.

N.S.W. RAILWAY TRUCK CAPACITY.

Shewing Concessions.

Truck.	Capacity.		Lengths not exceeding.	Average Weight.	Concession.
	Oregon or Kauri.	Hardwood.			
	Super.	Super.			
D. 6 ton	3,200ft.	1,600ft.	24ft.	4 tons	No Conces'n
D. 8 ton	4,800ft.	2,400ft.	24ft.	6 „	
E. Set	6,400ft.	3,200ft.	28ft.	8 „	10 per cent.
F. Set	14,400ft.	7,200ft.	28ft.	18 „	reduction
G. Set	9,600ft.	4,800ft.	27ft.	12 „	on usual
M. Set	14,400ft.	7,200ft.	34ft.	18 „	rates.

APPROXIMATE WEIGHT OF TIMBER, &c.

Per ton Weight.

Hardwood	360ft. super.	Cedar	700ft. super
Oregon	800ft. „	⅞ Baltic Flooring	1000ft.„
Kauri	750ft. „	¾ „ Lining	1200ft.„
fedwood	600ft. „	½ „ „	1600ft. „
6ft. Sawn H'dwood Palings,	350 count	Doors average	50 count
5ft. „ „	300 „	Stock Sashes, av.	100 pairs.
Hardwood Pickets	500 „	Bricks, ordinary	333 „

ASBESTOS CEMENT.

This building Material is made of Asbestos Fibre and Hydraulic Cement, in large flat sheets, about ⅛in. thick, and roofing slates in three colors. It is specially adapted for the covering of walls, ceilings, and roofs.

Its special qualities are toughness, lightness, coolness, and fire-resistance. It is useful for quickly erected light and cool constructions, ceilings for bay windows, or where vibration and heat have to be provided against.

"Durabestos" Cottage.

The makers design special artistic dwellings for this material.

Being of a uniform mottled grey colour, it harmonises with almost any color of fixture in its natural state. Special paints and distemper are sold for coloring.

This material differs in quality, and is sold under different names, as "**Asbestolite**," "**Durabestos**," "**Etemite**," "**Fibrolite**," "**Fibrocement**," "**Herculite**," "**Poilite**," "**Titanic**" (all trade names). See advt. pages 3, 35, 37.

SUGGESTIONS FOR FIXING.

The Standards, Studs, or Battens, in order to give a level surface should be of equal thickness, and spaced accurately at 24in. centres, with cross pieces nailed between the studs to receive the end of the sheets, butting together.

To make an even surface throughout, fill joints with Alabastine, ordinary cement mortar, or other slow setting plaster. Rub down. with pumice powder and glass paper.

To ensure an absolutely flush joint for unfilleted work, the edges should be shot with a plane and rendered with plaster as above.

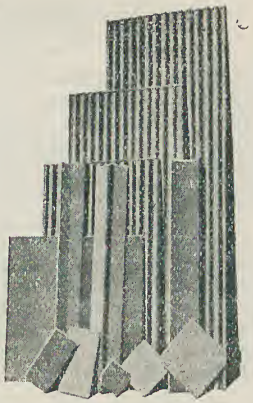
Otherwise the joints may be covered with wood fillets or other panelling material. Asbestos Cement Fillets 3in. x $\frac{3}{16}$in. thick may be used for a covering, the horizontal joints may be filled and stopped as above.

Asbestos Cement Sheets can easily be cut with hand saw (fine tooth), or deeply marked, or cut with chisel and straightedge and broken, or punctured along mark and roughly broken.

Blackboards are made of above material, 1/– per square yard.

Special Asbestos cement sheets can be made to order up to 1 inch thick.

Asbestos Cement Sheets.



Price per Square Yard.

Widths, 4, 3, and 2 feet.
Lengths, 3 to 12 feet.
3/6 in. thick, for external walls, 2/8.
For interior and ceilings, 2/5.

Labour fixing varies from 6d. per square yard, or 2s. upwards per 8 x 4 sheet. Generally reckon 2/6 extra per square yard, including cover pieces 2in. x ½in. oregon.

COVER STRIPS ½in. THICK PER 100 FT. RUN.

	Oregon Redwood			Oregon Redwood	
2in. wide ...	7/6	9/9	3in. wide	11/6	14/–
2½in. wide ...	9/–	11/6	3½in. wide ...	13/–	16/–

Labour at 3/– per hour, fixing 1d. per foot run wood, 1½d. plaster.
2in. plaster strips per 100, 12/6, 3in. plaster, 20/–.
Cornices plaster, scotia, etc., 3in., 3d. 4in., 3½d. 6in., 4½d.
Flat head gal. nails, 650 to 1lb., 1in. x 14 gauge, per lb., 9d.
Reckon 90 nails per square.
Special stopping cement, per lb., 2/–, 7lb. tin, 10/6.

EXAMPLE OF COST, PLAIN WALLING, ONE SIDE, PER SQUARE.

11 sq. yards of cement sheets, 3/16in., at 2/7	£1	8	5
Labour per square, say 6 sheets at 1/6 each		9	0
1 square 3 x 2 studding, 2 feet apart, fixed to top and bottom plate	1	15	3
90 nails	0	0	4
One side net cost	£3	13	0
If double sided, add extra sheets, etc. (about 10/– per sq. yd.	1	18	0
	£5	11	0

Weight of a single sheet 8ft. x 4ft., extra thickness ¼in. — 80lb. per sheet.

⅜in. thick, 100lbs., ⅜in. thick, 120lbs., ½in. thick, 168lbs.

SLATES AND ROOFING.

Lap, Slates and Battens, required per square.

The slates, about 16in. x 16in. square, are laid diagonally, with a 2¾in., and 3½in., and 4in. lap, according to pitch of roof ; nailed at three corners with galvanised flat-headed nails and copper disc.

Lap of Slate.	Gauge of Battens	Battens per Square	Number of Slates.	Weight per Square.
2¾in.	... 9in.	... 133	... 85	... 246lbs.
3½in.	... 8½in.	... 141	... 97	... 270lbs.
4in.	... 7½in.	... 170	... 100	... 302lbs.

A.C. Slates laid, weigh 22lbs. per sq. yd.

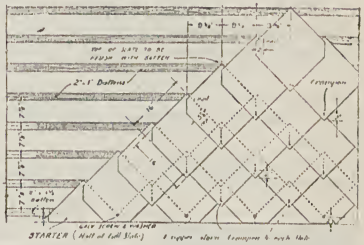
Labour laying, 8/6 to 10/6 per square.

See Roof Tiler award for Labour Rates. *Roof Tiler Section.*

First Course of Slates.—It will be noticed that, as regards the Slates of the first course, it is usual to trim off the bottom of each Slate so as to preserve a continuous straight line with the starters.

Stock Ridging in 2 pieces.
6in. x 6in., per ft. run, 10d.
8in. x 8in., per ft. run, 1/–.
9in. x 9in., per ft. run 1/1.

Labour fixing Ridging. 3d. per foot run, add mortar and cement, 3d. = 6d. net.



If crating is used for slates or sheets, add 3d. per sq. yd.

MATERIALS PER SQUARE OF ROOFING.

Shingles or Slates.

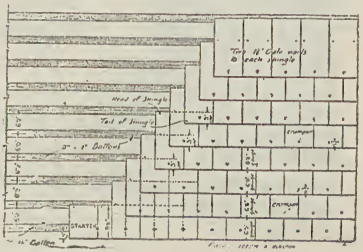
4in. lap, on 1½in. spaced Battens,	16 x 16 diag.	12 x 12	16 x 8 Laid Square.	20 x 10	24 x 12
Quantity per square ...	100	535	280	170	115
1¼in. x 13 g. gal. Slate nails	1lb.	5¼lbs.	2¾lbs.	1¾lbs.	1¼lbs.
Crampons required ...	100	nil	280	170	115
2in. x 1in. battens ...	170ft.	280ft.	200ft.	150ft.	125ft.
2½in. x 12 g., batten nails...	1lb.	1½lbs.	1lb.	1lb.	¾lb.
Weight of one square ...	360lbs.	510lbs.	485lbs.	500lbs.	400l

Diagonal Slating for A.C. Slates.

ESTIMATE DETAIL FOR ONE SQUARE OF ROOFING.

	£	s.	d.
100 slates at £21 per 1,000 ...	2	2	0
Oregon Battens, 141ft. run, 2in. x 1in., at 30/- 100 super ...	0	7	0
100 copper crampons at 22/- per 1000 — 2/3, clouts -/6 ...	0	2	9
Labour to battens including slates, nails &c. ...	0	12	3
Nett ...	£3	4	0

Sizes 16 ins. by 8 ins. and 12 ins. by 6ins.



Corrugated sheets in lengths 5, 6, 7, 8, 9, 10 x 2ft., 7½ wide.

Number of square yards of corrugated sheets per ton, 124 sq. yds., crated, 108 sq. yds.

The special qualities of asbestos cement make the sheets proof against rust or corrosion, acid fumes, alkalies, smoke, steam and dampness.

Used in covering roofs of dairy sheds, railway, wharf depots and wheat sheds, and roofs affected by sea air.

Being heavy and breakable, reckon 1⅓ times the cost for handling and fixing of gal. cast iron. Labour at 3/- per hour, viz., 12/- per 100 sq. ft. square.

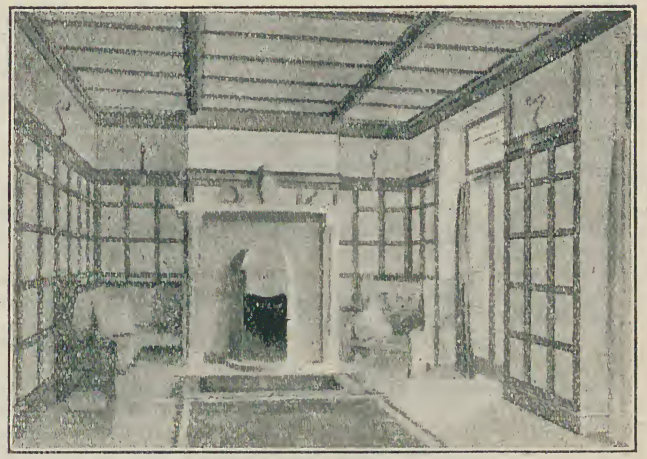
Plastic asbestos for covering boilers and tanks and hot water heaters, etc., also ice chests, **quantity required** to be applied in three consecutive coats, till 1¼in. thick, after painting the iron or copper with a thin coat hot.

Robertson Asbestos Protected Metal for Roofs is manufactured of a core of annealed oxidised steel immersed in hot refined asphalt coated with asbestos felt, saturated with asphalt, bonded to the core under heat and pressure. A waterproof coating is added.

The sheets are made in black, maroon and aluminium colours of standard lengths and gauges of steel core, Nos. 26 to 20. They are made straight or curved, and can be erected in the same manner at the same cost as ordinary corrugated sheets.

For further information *see Advt., p.* 13.

Asbestos Composition for cement boilers and hot water, in bags, 20/– and 30/– per cwt



COST OF PANELLED CEILING.

If sheets are used as a ceiling, with joists 2 feet apart showing, dressed in room, plain panelling nailed on top of joists, the net cost complete would be from 8/– upwards per super yard.

Example.—**Labour only. Lining** to verandah ceiling 75ft. x 12ft. wide under **street awning** in two 6ft. x 3ft. wide sheets.

Fixing five sets of 4 x 2 oregon bearers between eight steel framed cantilever T iron beams,fixing sheets with 5 x 1 oregon cover pieces over joints and ends to inserted cross bearers, erecting temporary scaffiolding, etc., clearingup at finish. The above ceiling contains 100 square yards,

Labour only. Two men, three days — 157 shillings.

Plain large surface or a little over 1/6 per square yard, fixing alone.

Fixing bearers and sheets worth 2/– per square yard = net cost of tradesman. Add for cartage, incidentals, 6d. per square yard.

It requires about 25lbs. to cover 1½ sq, yards or a tank 3ft. x 18in. diam., 1¼in. thick, 50lbs. to cover 4ft. 6in. x 2 ft. dia. boiler.

In bags, 50lb., 75lbs. and 100lbs., at 20/–, to 30/– per cwt.

Asbestos Roofing Felts are also made—a sandwich of bitumen felt with asbestos fibre covering, price per roll of 12 yards, 40/–.

Saturated felt. in rolls 9 yards x 1 yard, 24/– per roll.

Water Paint, for sheets, in 28 colours, 7lb., 4/6.

Petrifying Liquid, to add if necessary, 7/– per gallon.

Interior, 1 gal. to 56lbs., exterior use, 1 gal. to 28lb. paint.

7lbs. 1 coat of 45 sq. yards., 2 coats 25 sq. yards.

NON CONDUCTORS OF HEAT AND SOUND.

Arctic Packing, prepared of seaweed, per ¼ cwt. bale, 43/–. Will cover 250 sq. feet 4 inches thick.

ASPHALT.

Seyssel asphalte is made from a natural calcareous bitumen, found at Seyssel, near Pyrmont, department of l'Aix ; and " contains 90 parts of carbonate of lime to about 10 parts of bitumen " ; this is improved by the addition of tar or pitch by the Patentee.

The calcareous asphalte rock of Val de Travers, in Switzerland, contains 10 per cent. bitumen.

Bitumen, naturally combined with calcareous earth, forms a compact slightly elastic substance which is as durable as granite, " but no artificial mixture of coal tar and calcareous earth, carbonate of lime, or chalk has ever been produced at all approaching the natural asphaltes in durability. This is partly due to the difficulty in imitating the natural combination in mixing, but chiefly to the fact of the natural bitumen, being a kind of mineral tar, which will sustain 170 deg. of heat without injury, whereas asphalte made from coal (*vegetable*) tar, becomes soft at 115 degrees of heat.

Bitumen will cement wood to stone or iron, viz., a waterbar on top of a slate threshold.

Pure Bitumen is one of the oldest substances known as a waterproof material. It was employed in building ancient Babylon and Nineveh roof gardens, and for cementing the stones together, thousands of years ago, and this same bitumen, what there is of it, is in as good preservation to-day as when laid.

Pure Trinidad Bitumen on wharf or rail, £10 to £12 a ton, according to punntity.

Asphalte Blocks, for Sewerage Pipe Joints, etc., from £7 to £10 per ton. See advt. page 12.

MATERIAL AND LABOUR IN MELTING AND SPREADING.

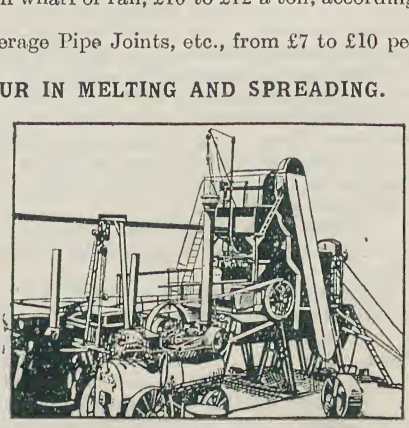
Five men, working one day of 8¾ hours, can melt and spread 2½ tons of asphalte, 1 inch thick, using a 6 cwt. caldron.

6 cwt. asphalte will cover 7⅛ yards ¾in. thick.

Ditto, 6 yards, 1in. thick.

3½ cwt. of coal, or ½ ton firewood required to melt 1 ton of asphalte in a 6 cwt. caldron.

Asphalte for Roads.—See Roads.



ASPHALT ROAD SURFACING PLANT.

Asphalte should be laid in a mastic state and rubbed smooth with trowel in covering arches, walls, floors, roofs, and in damproof courses, reservoir, but for surfacing roads, asphalte in a powder form is spread and consolidated with hot irons, in all cases the bed must be thoroughly dry.

Thickness required for dampcourses ½ to ¾in. floors and roofs ¾ to 1 in.

Vertical walls and reservoirs, 1 to 1½in. Roads and pavements- 1 to 2 in. Generally, for surfacing, the concrete foundation is pre, viously rendered smooth in cement.

Quantity required, 12½ lbs. asphalte will lay 1 foot sup. 1 in. thick.

ASPHALTE FLOORS, ROOFS, Etc.

Prices, per super yard, Laid complete.

	Melbourne or Sydney
ROOFS.	
(Rock) Asphalte, 1in. thick (2 coats)	10 0
Val de Travers or Neuchatel, ¾in. thick	9 0
Asphaltum, 1in. thick, 2 coats	8 0
Asphaltum, ¾in. thick, 2 coats	7 0
FLOORS OR PAVEMENTS.	
Val de Travers or Neuchatel Asphalte, 1in.	10 0
Limmer (rock) Asphalte, 1in. thick	9 0
Ditto ditto, ¾in. thick	7 0

Paint, Asphaltum, 1 coat, 1/–; 2 coats, 1/6 per sq. yd.

Ditto, 4 gallon tins, 3/– per gallon.

Marine Glue, black, in 56lb. tins, 12/6.

For quotation and quantities, see page advt. 4, 12.

MALTHOID AND OTHER ROOFING FELTS.

In Rolls (72ft. x 3ft. wide—24 yards each roll.)

One roll will cover 20ft x 10ft., or 3 squares, including laps.

	1 ply	2 ply	3 ply
Malthoid and Ruberoid	32/–	38/–	45/–
Ormonoid	29/6	35/6	42/6
Maltha Roofing (Australian)	30/–	36/–	44/–
Risteroid...	32/6	40/–	47/6
Average Weight per Roll	70lbs.	88lbs.	114lbs.

P. & B. Ready Roofing, gravelled, 32ft. x 40in. wide, per square, 44/–

(*See manufacturers' advt., p.* 15.)

OTHER BITUMINOUS ROOFING FELTS.

	per Roll.
Kaloroid is a Colored Ruberoid	40/– to 53/–
Vulcantile is another similar Felt...	53/–
Ornamentile is a Vulcanite Bituminous Roofing made in rolls 16 inches wide, with shingle pattern, cut to various designs. The color is added by a surface of crushed slate or minerals of different shades of greys, Terra Cotta, brown, and grey green, 4 rolls of 50lbs. each, cost per square	44/–
Ruberoid Cloth, 29in. wide, per yard	2/–

Ruberoid, Red or Brown Roofing, 53/6; Green, 60/– per roll; covers 210 square feet.

A layer of gal. iron wire netting, large mesh, stretched tightly over rafters or battens, form a very good and cheap support for these roofing felts.

TAR PAVEMENTS.

Material necessary for 10 sq. yards, 3in. thick. s..d

14 gallons of Tar to 1 ton of metal screenings, mixed to 90 degrees is sufficient.

40 gallons of tar will mix 5 tons of blue metal shivers, ¾ gauge.

N.B.—Tar required for 6in. tar concrete paving, viz., 3in. of 2in. metal, tarred after spreading, 2in. smaller metal mixed with tar, topped with 1in. tar and coke dust, requires from 1¼ to 1½ gallons per super yard. (See Road Making.)

Tar per gallon at Gas Works: Melbourne, 9d., Sydney 0 6

Larger quantities less; add cartage.

TAR-CONCRETE OR COMPOSITION PAVEMENT.

Namely, 2½in. of 2in. bluestone metal foundation, 1in. coarse, and ½in. fine screenings, the whole mixed with tar, and dusted over with bluestone dust.	2¾in. thick ...	5	6
	4in. thick ...	7	0
	5in. thick ...	9	0
	6in. thick ...	12	0
Painting with hot tar and sand, per super yard, at 7½d. gal ...		0	11
1in. Tar and Sand Top-dressing and Rolling, fine top		2	0
3in. Tar concrete footpaths, with gravel foundation covered with 1in. tarred blue metal screenings		4	6

TARRED ASH PAVEMENT.

Example Materials Required.

20 square yards, 1½ inches thick when rolled

One load ashes	6	0
20 gallons tar at works, 4½d.	7	6
1 mile cartage	4	6
Materials—Net cost	18	0

Add labor, spreading and rolling.

N.B.—If on clay foundations, spread 2 inches of dry ashes to prevent cracking.

Prices, Retail.

Coal Tar, retail 8d. per gallon.

COST OF LAYING ROOFS, PAVINGS AND STREETS.

in. Thick, Labour Only.

	per sq. yd
Price for large surfaces, from	1/6 to 2/-
For Roofs, about 200 sq. yds. and 40 to 50ft. above pavement, from	2/- to 2/6
Taking up old asphalte paving, 4in. thick, and removing debris 30 feet, add	-/9
Taking up old blue metal tar-paving up to 4in. ditto ...	-/8
Taking up old cinder tar-paving ditto	-/6
Loading debris into cart, per cubic yard load, from ground	-/8
Dumping	-/2
2¾in. Tarred Ash paving, per square yard	4/-

Foundation 2in. tarred ashes; 1in. blue metal screenings rolled to ¾in.

It requires 33 gal. of tar for 1 cubic yard of ashes or coke screenings.

BUILDERS' SCHEDULE PRICES

(N.S.W. GOVT. BUILDERS SCHEDULE PRICES, 1926).

EXCAVATOR.

	per sq. yd. £	s.	d.
Remove surface soil to 6in. depth and spread on site. ...	0	0	6
Excavate to 12in. soil, carting and removing 150ft. away from site, 1/3 ; per cub. yd., 4/6 ; removing from site	0	8	6
Excavating **trenches** not exceeding 6 feet, remove surplus within 150 feet ; fill and ram including trench planking and storing, levelling bottom, per cub. yd.	0	5	0
Ditto, Removing from site, per cub. yd.	0	9	6
Every additional 6ft. below 6ft. — 1/6 extra.			
Excavate in **rock**, not exceeding 6ft., levelling bottom, and removing from site	1	7	0
Ditto, with limited use of explosives	0	14	6
For each additional 6 ft.	0	3	6
Excavate **trenches** in **rock**, no explosives, not exceeding 6 ft., return and fill, remove surplus, within 150 ft.	1	8	6
With use of explosives	1	4	0
If surplus material removed from site, 4/– ; if additional 6 ft. depth	0	4	4

DRAINER.

Providing material laid complete.

Glazed Earthenware Pipes.

Jointed in cement mortar, including trench to 2 feet deep. Fill in and ram per foot run.

Extra	12in. dia.	9in. dia.	6in. dia.	4in. dia.
With rock guttering	5/5	4/3	2/11	2/–
	4/6	4/–	3/6	3/3
with explosives	4/–	3/6	3/–	2/9

Extra Charge on Straight Pipes.

	12 inch Bend Junctions at Elbows, T Taper Pipes.	Double Junctions.	Extra value inspection pipes with Cleaning Eyes
12 inches	2/9	5/6	
9 inches	1/9	3/6	
6 inches	1/–	2/–	6/–
4 inches	–/9	1/6	5/4

8in. and 9in. dia. G.E. gullies with 18in. x 18in. G.E. sink stones and gal. iron grating £1 3 0

6 Buchan Traps, including pointing in cement 1 4 0
4in. ditto, 16/–.

Agricultural pipes, 6in., 1/2, 4in., 1/– per foot run laid.

CEMENT CONCRETE.

¾in. **Blue Metal Screenings.** Mixture, 4:2:1

Concrete ditto **foundations,** including all necessary boarding, per cub. yd.	£2	18	0
1in. hard stone filling under concrete	0	10	0
	per super yd.		
Floors, 5in. thick, finished while green, with ¾ 2 to 1 rendering	£0	12	0
4in. thick, 11/–, 5in. thick, screeded for paving, 9/10, 4in. ditto, 8/9.			
5in. **blue metal floors,** as above, reinforced concrete, "*screeded*" *for paving*	0	10	6
Timber sheeting and reinforcement extra.			
	per cub. yard.		
Blue metal reinforced concrete to **columns** (no form) ...	£3	14	9
Ditto, **beams,** ditto	3	11	0
Retaining walls, over 12in. thick, timbering and reinforcement to be added	3	3	0
Walling, 6in. to 8in. thick, blue metal reinforced concrete...	3	15	0
Blue metal concrete **encasing R. Steel Joists,** including wire wrapping, timber centering and supports	7	9	0
Coke breeze lintels, including centering supports, and reinforcing bars	4	2	0
Cement concrete in flights of **steps,** rendering where exposed including forms of timber	5	0	0
Blue metal concrete **stairs,** and landing with nosed heads, and cement rendered where exposed, including forms of timber	10	0	0
Cement concrete plain 10in. x 6in. steps, **cement rendering** where exposed, complete, per foot run	0	4	0
2in. thick blue metal cement concrete nosed **thresholds** for doorways, per foot run	0	3	6

MASON.

Material and Labour Complete.			
	per perch.		
Random Rubble work built in lime mortar and pointed ...	£1	10	0
Ditto. Regular coursed work ditto.	1	18	0
Squared rubble coursed and uncoursed	2	0	0
Extra, if built and pointed in cement	0	2	6
	per cub. ft.		
Dressed Stone in blocks, any dimensions under 40 c. ft., built in courses in lime mortar including axed beds and joints	0	10	6
Extra if pointed in cement mortar, per sup. ft.	0	0	4

LABOR ONLY.

	per super foot.		per super foot.
Clean chiselled	2/–	Clean chiselled and tooled and rubbed sunk work	3/–
Fine tooled faces ...	3/6	Ditto moulded girt measure	12/6
Rubbed faces	2/4	Ditto. circular work ...	25/–
Extra for pointing and putty	–/9		

ASHLERS.

9in. or under on bed in courses, not over 13½in. high, clean chiselled on faced, axed on beds and joints and built in mortar lime	per super foot. £0	9 0
Ditto., finely tooled on face, ditto.	0	9 6
Ditto., rubbed on face, ditto.	0	12 0
1¼in. **Rubbed slate thresholds,** nosed on edge, return ends set in cement	0	7 0
1½in. ditto, 8/3. 2in. ditto, 9/–. 1⅝in.	0	8 3
1in. slated, rubbed both faces and edges (*shelves*)	0	6 8

PAVIORS.

	per super yard.	
1in. thick, cement rended 1 to 1 sand or blue metal screenings	£0	4 7
2in. thick cement **covings** to floor and wall junction, per foot run	0	0 10
3in. thick blue metal tar paving, finally tarred and sanded complete, including grading, levelling, etc.	0	3 10
4in. thick ditto.	0	4 6
Painting with hot tar and sanding old roads and paths ...	0	0 5

BRICKLAYER.

	per rod.	
Reduced Brickwork, in cement mortar to **solid walls**... ...	£34	7 0
Ditto., lime mortar, ditto	31	3 0
Reduced brickwork in cement mortar, **hollow walls**... ...	37	0 0
Ditto, in lime mortar	32	16 0
	per super yard.	
Extra for facing walls with O.K. bricks	£0	2 0
Extra for **pointing** with **cut, struck** and weathered joints, and cleaning down with spirits	0	1 0
Pointing old work, including raking out joints	0	3 6
O.K. squint bricks, sills in cement mortar, per foot run ...	0	0 9
9 x 6 terra cotta louvred air-bricks, each	0	1 3
9 x 6 terra cotta hooded ventilators	0	2 6
	per yard square.	
Brick on edge floors, bedded in sand and grouted in cement,	£0	8 7
On **flat**	0	8 6
	per foot run.	
Brick **surface drains,** including all forming and grading, laid in cement	£0	1 8
Dampcourse, Leadite or natural asphalte, per yard super ...	0	7 9
3-ply Bitumen **dampcourse,** ditto	0	5 0

CARPENTER AND JOINER.

	per yard super.	
Timber Sheeting and **supports** for **concrete walls, Floors. etc.**	£0	5 6
	per 100 ft. super.	
Hardwood in **plates and joists** to ground floors	£2	5 6
Oregon, ditto, ditto	2	2 4
4 x 1 H.W. T. & G. **flooring,** double nailed, punched, per square puttied and cleaned off	£3	7 0

6x 1 H.W. ditto, £3. 4 x 1¼ H.W. ditto, £4/2/–.
4 x 1 **Tallowwood** T. & G., £4 ; 1¼ ditto, £4/14/–.
4 x 1 Pine T. & G. flooring, £3/6/–. 6 x 1 Pine, £3/15/–. 4 x 1¼ pine T. & G. flooring, £4/16/–.

WALLING.

	per 100 ft. super.
H.W. plates, studs	£2 8 0
Oregon ditto	1 15 6
Extra for dressing H.W.	0 10 0
Extra for dressing Pine	0 5 0
H.W. Verandah Posts	3 0 6
	per square.
8 x 1 H.W. dressed rusticated weather boarding	£3 10 0
Ditto, mahogany, dressed	3 14 0
7in. H.W. dressed and splayed weatherboard	2 13 0
6 x ¾ Pine T. & G. V jointed lining on walls and ceilings, etc.	3 9 0
6 x ½ ditto ditto	2 15 6
4 x ¾, double dressed lining partitions	3 15 0
4 x ⅝, one face, lining on walls and ceilings	3 9 0
4 x ½ ditto ditto	2 19 0
	per yard super.
3/16in. thick Fibro cement sheets, to walls with pine cover slips	0 5 6
5/36in. Fibro cement sheets, ditto	0 5 3

ROOFING.

	per 100 feet super.
H.W. plates, rafters, ties and struts	£2 17 0
Oregon plates, rafters, ties, struts, purlins, hips, ridges, and valley boards	2 5 0
Oregon in Tie beams, principal rafters, king posts, struts, etc.	3 18 0
	per foot run.
10in. x 1½in. wgt. Pine barge boards, with planted ends ...	0 1 4
8in. x 1½in. ditto	0 1 2
9in. x 1in. Pine wgt. Fascias, –/9, 6in. x 1in. Fascias ...	0 0 6

WINDOWS.

	per foot super.
1¾in. Oregon glazed sashes, divided with sash bars, door hung in pine box frames, H.W. sills, with pulleys, sash cords, C.I. weights, complete	£0 6 0
1½in. Oregon glazed sashes, ditto, ditto	0 5 9
Louvred windows, with oregon frames, H.W. sills and red-wood louvres	0 3 6
Ditto ditto, plate glass louvres	0 6 6
Casement windows, with H.W. sills, oregon frames, 1¾ moulded sashes, divided with bars and glazed, hung in frames with 3 steel hinges	0 6 0
Ditto ditto, with 1½in. moulded sashes	0 5 9

DOORS.

	per set.	with transoms.
5 x 3in. H.W. Door Frames	£1 14 0	£2 5 0
Oregon Door Frames	1 14 0	2 5 0
5¾in. x 1½in. oregon rebated jamb linings ...	0 17 0	1 4 0
10½in. x 1½in. double rebated jamb linings ...	1 7 0	1 14 0

DOORS—*continued.*

	per foot super.
2in. pine framed panelled and moulded **folding doors**, upper panels prepared for glass, hung to frames with 4in. steel butts	£0 3 6
1¾in. pine framed panelled **folding** doors	0 3 3
1¾in. pine framed moulded doors, all wood, hung to frames...	0 3 8
1½in. ditto	0 3 0
1¾in. pine framed bead and flush **doors**, upper panels prepared for glass	0 3 9
1¾in. **Framed and Ledged folding doors**, hung to frames, 4 butts	0 3 2
1¾in. ditto, single doors	0 3 0
1in. ditto and braced **folding doors**, hung to frames with T hinges	0 2 0
1in. pine **ledged and braced doors, single doors** hung to frames, T hinges	0 1 9
1¾in. pine framed, panelled and moulded **folding casement doors**, prepared for glass, hung to frames, 4 butts ...	0 3 7
1¾in. ditto, with transoms	0 3 4
1½in. pine, framed moulded fanlights, hung to transoms ...	0 3 2

FINISHINGS, FIXED.

Per foot run.

4in. x 1in. pine moulded **architraves**, –/5. 5in. x 1¼in., –/7½.
6 x 1½in. pine moulded **architraves**, –/9½.
6in. moulded **skirting**, –/9½. Ditto, –/10. 12in. skirting, 1/2.
1in. pine, quarter round, –/2¼. 1½in. ditto, –/3. 2in. ditto, –/4¾. Pine mouldings, per 1in. girth, –/2.

FENCING AND GATES.

Per foot run.

6ft. H.W. **Paling fence**, 3/–. 5ft. ditto, 2/6.
4ft. 6in. **mahogany** wgt. picket fence, 3/8. Post and 5 **wire fence**, –/9.
3in. oregon framed braced, ⅞in. and sheeted **folding gates**, including H.W. **posts, sills,**

Per super foot.

and hung to posts with Smith made W.I. **strap** hinges, ... 5/–.
2½in. mahogany framed gate in picket fence, with 5 in. x 3in. H.W. posts and hung to posts with 16 Scotch T hinges, ... 4/6.

IRONFOUNDER.

Per cwt.

R.S. Joists, various sections set in position, £1.
Steel reinforcing bars, any section, set in position and wired, £1/3/–.
Wrought iron camber arch bars, per lb., –/3.
Wrot. iron straps and bolts, for roof principals, –/2.

ROOF COVERINGS.

SHINGLER. Per square.

Split **oak shingles,** including battens, cutting and waste, ... £5/4/6.
Sawn **redwood shingles,** £4/9/–.

SLATER.

Bangor slates, including battens, cutting and waste, and rendering under joints, etc., £8/1/–. **Australian slates,** ditto, £8.

TILER.

French pattern T.C. tiles, red, including battens.
Wiring and cutting to hips and valleys, £3/10/–.
Ditto, in dark **chocolate** colour, ditto, £4/5/–, **glazed chocolate,** £4/10/–.
Shingle tiles, including battens, cutting and wiring, etc., £6/10/–.
Ridge tiles, per ft. run, –/9, chocolate and glazed, per foot run, 1/–.

PLUMBER. Per square.

Roofing, 24 gauge galvanised corrugated iron on roofs, fixed with screws and washers, £2/13/–.
26 gauge galvanised corrugated iron, £2/2/–.
24 ditto, with spring head nails, £2/14/–. 26 ditto, £2/1/–.
26 gauge **small** section gal. cor. iron, £2.

Per cwt.

Lead in gutters, £4/4/–. **Lead flushings,** £3/17/–. **Lead damp-course,** £3/10/–.

Per foot run.

18in. 24 gauge gal. iron **ridge capping,** –/10.
4in. 25 gauge gal. iron **quadrant gutters,** including brackets, elbows, stop ends and drops, 1/2.
5in. 24 gauge gal. iron **gutters,** ditto, 1/4.
3in. dia. 24 gauge gal. iron **down pipes,** fixed with simple ears, including all elbows and swan necks, 1/–.
4in. 24 gauge ditto, 1/2. 24 gauge gal. iron rain water heads, £0/10/– each.

Per super foot.

26 gauge gal. plain iron, in **gutters** or **flat roofing,** –/9.
26 gauge ditto, plain iron **flushings,** 1/–.

SANITARY PLUMBER.

4in. dia. **cast iron soil pipes,** with lead staved joints, per foot run.
fixed with ears, 3/10.
3in. dia. **C.I. waste pipes,** ditto, 2/10.
2½in. dia. **C.I.** ditto, 2/7. 2in. dia. ditto, 1/5.

Extra. Inspection door for 4in. **C.I. soil pipe,** 4/10. Each.
C.I. Bends and elbows, 4/4. 3in. dia. ditto, for **waste pipes,** 3/–
2½in. dia. bends and elbows, for 2½in. **waste pipe,** 2/–. 2in. 1/9
4in. C.I. junctions and branches 7/–.
3in. C.I. ditto, 5/2. 2½in. ditto, 5/–. 2in. ditto, 4/–
4in. C.I. bends and elbows, with inspection doors to soil pipe, 9/2.
3in. C.I. ditto, 7/2. 2½in. C.I. ditto, 5/9. 2in. C.I. pipes, 5/1
4in. C.I. **branches and junctions,** with inspection doors 12/–
3in. C.I. ditto, 9/6. 2½in. C.I. ditto, 8/8. 2½in. C.I. ditto 7/3

LEAD PIPE.

Per foot run.

4in. dia. lead **soil** pipes, 9/6. 3in. lead **waste pipe**, 8/3.
2in. ditto, 2/6. 1½in. waste pipe, 2/10. 1¼in. lead waste, 2/3.
2in. **lead traps**, with cleaning eyes, each 16/3. 1½in. ditto, 13/6.
4in. x 24 gauge gal. iron **vent pipes**, fixed with simple ears, 1/2.
3in. ditto, 1/–. 2½in. ditto, 1/–. 2in. ditto, –/11.
4in. 24 gauge gal. iron **cowls**, each 5/6. 3in., 5/–. 2½in. 4/2.
2in. ditto, 3/7.

WATER SERVICE.

Per foot run.

2in. wrt. gal. iron **water service pipes**, including all bends, tees, crosses, etc., and cutting and filling tracks. –/3. 1in½. ditto, 2/2. 1¼in. ditto, 1/9. 1in. ditto, 1/5. ¾in. water service pipes, 1/1.

Each.

2in. brass H.P. slip cocks, £2. 1½in. brass ditto, £1/3/–. 1¼in. ditto, 18/–. 1in. ditto, 10/6. ¾in. brass H.P. stop cocks, 8/6.
Cast iron footpath boxes, 5/6. ¾in. brass H.P. slip cocks, 4/9. ½in. ditto, 4/8.

GAS SERVICE.

Per foot run.

2½in. black iron **gas service pipes**, with bends, junctions, tees, 2/–.
2in. ditto, 2/6. 1½in. ditto, 2/–. 1¼in. ditto, 1/9. 1in. ditto, 1/4.
¾in. ditto, 1/2. ½in. black iron gas service, –/11.

PLASTERER.

Per yard super.

Render, float and set walls, ¾in. thick average, 3/–.
Float and set walls and ceilings, 2/8.
Lath, render, float and set, 6/–. ½in. **cement, render** walls, finished off wooden float, 3/–. ¾in. ditto, 4/3. **Rough cast** in **cement mortar**, 2/6.
1in. cement render on **floors**, finished off steel float, 4/–. Rounded internal angles, per foot run, –/4.
Plaster cornices and mouldings, per inch girt, –/3.
Cement cornices and mouldings, per inch girt, –/2½.
Plaster board on ceilings, including, and fixing battens and 3in. plaster cover mouths on joints, per yard super, 5/–.

PAINTER.

Per yard super.

Four coat paint work, 2/6. **Three coat**, 2/–. **Two coat**, 1/8. **One coat** paint work, 1/–.
Clean off all ruts down old work, –/4. Burn off old work, 2/–.
Stain and **Two coat Varnish**, 1/–.
French Polish, per foot super, –/7.
Two coat lime wash, per yard super, –/6.
Two coats kalsomine or similar distemper, –/8.
Two coats ditto, preparing walls for same, –/11.

WRITER.

Lettering to detail, paint colours, per inch, –/1½. Ditto, with gold leaf on glass, –/4½. 1¼in. with 1¼in. lines in oil paint, per ft. run, –/2.
Anti Ant or **wood preserving oil**, on floor timbers, –/4 per yd. sup

GLAZIERS. (Per foot super.)

21oz. ditto, 1/5. 26 oz. ditto, 1/8.
Artic, etc., glass and glazing, 2/1.
¼in. **Polished Plate** glass, up to 50 super foot, 7/–.
Artic, etc., glass and glazing, 2/1.
¼in. **Polished plate** glass, up to 50 super foot, 7/–.
Cutting out old glass and preparing for reglazing, per ft. super, –/6.

SCHEDULE OF WAGES AS PER INDUSTRIAL AWARDS AND AGREEMENTS. (July 5th, 1926,)

Trade.	Hours.	Wages.	Date when takes effect
Bricklayers	44	2/10½	1/8/24
Builders' Laborers (Federal Award)	44	2/4¼	30/4/26
Builders' Laborers (State Award) ...	44	2/3¼	4/1/26
Buidlers' Carters	44	£4/9/6	7/9/25
Carpenters & Joiners	44	2/9	23/5/24
Crane Drivers	44	2/9½	2/10/25
Hoist Drivers	44	2/6	19/6/25
Electrical Mechanics	44	2/5 8/11	4/1/26
Masons	40	3/–	9/6/24
Painters	44	2/5½	15/5/25
Plasterers	44	2/6	4/1/26
Plumbers	44	2/7⅞	4/1/26
Plumbers (Newcastle)	44	2/5 19/22	4/1/26
Quarrymen (hardstone	44	2/5 4/11	11/12/25
Quarrymen (sandstone)	40	2/8¼	11/12/25
Railway, Road, Bridge, etc., Laborers	44	2/1½	4/1/26
Rockchoppers in Sewer Trenches, Tunnels, etc.	36	3/3	7/9/25
Rockchoppers in other work	44	2/8	7/9/25
Slaters	44	2/9 5/11	4/1/26
Wharf Carpenters	44	2/6 6/11	4/1/26
Machinists (Gen. Joiners)		£5/11/6	
(weekly)	44	£5/9/6	30/4/26
Machinists (Laborers) (weekly) ...	44	£4/10/6	30/4/26
Motor Waggon Drivers (carrying capacity not exceeding 25 cwt.) ... (Each additional ton, 4/– per week extra.)	44	£4/11/6	18/9/25

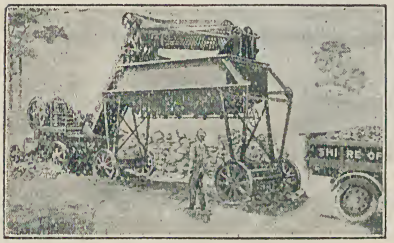
PRICES OF MATERIALS.

Bricks (common), at kiln, per 1000 ... ... 70/–
Cartage of brick to site (as per current rates).
Timber (basic prices) :—
Hardwood (per 100 feet sup.) 35/6
Oregon, 12in. x 6in. and over 25/–
,, 2in. x 2in. and under 12in. x 6in. 27/–
Baltic, 6in. x ¾in. 35/–
,, 6in. x ⅝in. 38/–
Redwood 56/–
New Zealand Rimu (6in. Flooring) 59/–
Cement, per 3 bags, according to quantity 20/– to 22/6
The above prices, with the exception of bricks, are for city delivery.

BALLAST AND METAL.

PRICES.

Subject to Fluctuation.



Stone Portable Crushing Screening and Loading Hopper Plant see Advt., p. 13, for prices and detail. A Stone Breaker with 16 x 9 inch jaws, cost, from £225, Petrol, Oil Engine or Electric driving Power, — to a ¾ h.p. engine. Will break 1 ton per hour.

Clearance 6ft. 6ins. to 9ft. underneath.

Portable plants from 4 tons to 18 tons per hour capacity, and **stationary** plants up to 40 tons per hour. This combination is sometimes employed in Australia by municipalities and shires.

Capacity stone crushed : **Portable,** 6 to 10 tons per hour ; **Stationary** 60 to 80 tons per 8-hourday. £860. Mounted on all steel carriage.

For further particulars, please refer to *Advt.*, pp. 13, 36.

Amalgamated Blue Stone Quarries, Machine Broken	Ton of 24 c. ft. per ton
2½in. metal	10/–
1½in. metal	10/6
¾in. metal	11/–
¼in. metal with dust	10/9
⅛in. metal without dust	13/6
Spalls	9/3

On Truck, Darling Island or Alexandria, cartage within one mile, 4/– per ton.

Broken (earthen) pipes for concrete, per single load	7/6
Waste bricks or clinkers from brick kilns	6/–

HORNSBY QUARRIES.	F.O.R. Hornsby Per Ton. s. d.	Darling Harbour, per Ton. s. d.
¾in. Breccia Screenings	11 0	... 13 0
1½in., 2½in. gauges Road Metal	10 0	... 11 6
¼in. Ballast Screenings, including dust	10 9	... 12 6

Special quotations are given for quantities. See advt., page 12.

Melbourne Bluestone, 2½ and 1½ gauges, 9/– to 10/–, delivered on jobs, Melbourne ; ¾ gauges, 11/–.

COARSE RIVER SAND AND GRAVEL.

Emu Plains, Nepean River.

	s.	d.
Nepean River Screened Sand, per ton		
On Truck at Emu Plains	5	0
On Truck, Darling Harbour	8	0
On intermediate suburban stations	8	0
On Truck North Sydney Station	8	6
Motor Cartage within 1 mile of line	3	6
Screened Sand, Melbourne, city delivered	8	0

HAND-BROKEN ROAD METAL.

Labour only, per Cubic Yard.

Wages of Stonebreaker, 2/3 per hour.

	per c. yard. s.	d.
Bluestone or trap rock, broken to a 2½in. ring gauge ...	7	6
White metal	5	6
If hard sandstone, gritstone, brick or quartz	5	0
Wheeling and spreading within 60 feet	2	6

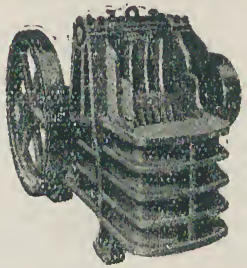
WEIGHT OF RUBBLE ROAD METAL, Etc.

	p. cu. yd. cwt.	cu. feet per ton.
Granite Rubble	30	18
Bluestone rubble	29	20
Sandstone rubble	28	19
2½in. Bluestone Metal	26	24–26
2in. Bluestone metal	25	25–27
2½in. Sandstone metal	24	22½
2in. Sandstone metal	23	22
Sand or fine gravel ballast	22½	24
1in. Bluestone screenings	23	27–28
Small Coke or Breeze	12	41
Shingle or Old Mortar	21½	25
Mortar, new	19	28

STONEBREAKING MACHINES will break from 6 cubic yards of 2½in. ring gauge bluestone per hour, with two men to supply the stone, etc., at about 2/–.

If spalls or small rubble can be obtained at a quarry within a mile of the machine, 2½in. ring gauge bluestone metal may be supplied and loaded into drays or motor lorry at a cost of 9/– per cubic yard.

STONE CRUSHERS.



CRUSHER.

No. 1-B. Crusher, weight 2200lbs., capacity about 25 tons 2½in. metal per day of eight hours. This Crusher would require 4 to 6 h.p. to drive it.

It is fitted with extra pair of Jaws and a Toggle Plate, price £185 net cash f.o.b. or f.o.r. Sydney.

In measuring ballasting for railways or tramways, the sleepers should be deducted for net measure.

For different makes see agents' advt. pages 7, 13, 14, 19.

CLAY PUDDLE.

Per Cubic Yard.

Wages of laborer, 2/1 per hour, with use of tools.	s.	d.
Excavating for clay, getting, filling and wheeling one stage, not exceeding 20 yards	4	0
Chopping and watering for tempering	2	0
Tempering after clay has been soaked	2	0
*Filling, wheeling one stage, tipping to place required, and treading	3	0
	11	0
If unbearing is required to get the clay, add per foot in depth to be removed	1	0

When the clay is tipped into, and can be tempered in the place required, leave out item marked thus*.

Clay puddle, when properly prepared, should be similar to brick earth ready for moulding.

The use of tar concrete (coke dust and tar) mixed together in thin layers, would form an excellent substitute for puddle where clay is scarce. It would also save excavation, as two inches of this stuff would be ample, instead of nine inches of clay.

The use of cement water proofing powders and liquids, where applicable, is preferred. See Painter Waterproof Materials.

BRICKLAYER.

MEASUREMENT.

In measuring brickwork all flues are to be measured as solid work below the roof, but above the roof (for labor only) the girt is taken by the thickness of brickwork round flue, and this multiplied by the height, including projections, which are girted. Piers, pilasters, quoins, etc., are also girted for labor only.

The shortest method of reducing cubic feet to the standard thickness of 1½ brick, is to deduct one-ninth, or multiply by 8 and divide by 9.

To reduce 1 brick to 1½ brick wall, deduct one-third from the given area.

In measuring height of walls, the wall-plate is included for setting, or allowed for separately.

Footings.—If the projection of the footing is in regular offsets, three or more courses high, the average dimension is sufficient; otherwise, each course must be taken separately.

Then take the walls above the footings to the ground storey, each thickness storey by storey, to the top.

All additions, as chimney breasts, etc., for each floor to be taken.

If any brickwork is carried up in cement, it can be allowed for and placed under a separate head.

Measure chimney shafts, the width, height, and thickness.

To measure the projections for cornices, courses to chimney shafts, etc., take the several lengths and multiply by their width, and the thickness beyond the face of the brickwork previously taken. Circular work is measured on the curve, in the centre of the wall, for very quick curves and otherwise by external face.

The Deductions.—Deduct all windows, doors, openings, etc., on each floor. It is recommended to take the width of the opening first, and then the height.

If the reveals are square, deduct in one dimension. If recessed, they must be taken in two or more.

Facings are measured by the square yard. Take the width of the walls to be faced, with all returns, and then the height, deducting any stone or cement cornices, plinths, facing, etc., out of such height; also deduct windows or other openings. Keep moulded bricks separate.

Flat joint and tuck pointing are measured by the square yard.

Number all sash and door frames, bedded and pointed; if over 28 feet superficial, keep separate in estimate.

Brick walls, if classified together according to their thickness, admit of a more equitable estimate being made than by the common and laborious method of rods.

As many builders prefer to do away with the tedious rod method and measure their brickwork by the simple thousand bricks, a fairly accurate way of arriving at the number of bricks in job, is to measure superficial area, and reduce the walls to 9-in. work, then allow nine bricks per super foot or take separate wall thicknesses and reckon by table below face measurement of brickwork.

Example: A wall 20ft. long x 10ft. high equals 200 super feet; 200 x 9 = 1800 bricks required.

MEMORANDUM.

Good Mixture for Mortar, 1 Bag Lime.

Lime mortar of good quality will result from mixing one bag or 2 cwt. of fresh burnt lime with an ordinary tipcart load of sand, about 32 bushels, or 25 cubic feet, and will be sufficient to lay about 1000 bricks.

For 4½-inch walls it is advisable that an addition of 10 per cent. of cement to mortar mixed as above will produce a stability and firmness in the wall that will more than repay the additional outlay.

A bricklayer's hod working load will hold 14 bricks, 12 on ladder, or ½-bushel of mortar.

Labor.—A good tradesman should lay per day of eight hours—600 to 700 bricks of 9in. work in cement, struck joint;

700 to 1000 bricks, 14in. work, in mortar, and 500 in O.K. or picked face worked.

Space Taken and Material Required to Make 1000 Bricks.

1000 bricks stacked close measures 55 cubic feet small English.
" " stacked close measures 66 cubic feet. Australian machine-made.
" " can be made from 3 cubic yards of solid clay.
" " require 8 to 10 cwt. of coal fuel—open kiln.
" " require 2 to 3 cwt. of coal in a Hoffman kiln.

ONE ROD OF BRICKWORK Contains—

About 3700 Sydney machine-made bricks.
272 feet super, of 1½ brick, or 13½ inches in thickness.
408 feet super of 1 brick, or 9 inches in thickness.
816 feet to half brick, or 4½ inches.
Or 11⅓ cub. yds., or 306 cub. ft.
Or 235 cub. ft. of bricks and 71 cub. ft. mortar.

FACE MEASUREMENT OF BRICKWORK.

4½ bricks to one super foot of walls half brick thick.
9 bricks to one foot superficial or face of 9 inch thick.
13½ bricks to one foot of brick and a half thick.
10 bricks to one foot superficial of gauged arches.
18 bricks to one foot superficial two bricks thick.
12 bricks in mortar = a cubic foot.

MATERIALS REQUIRED FOR A CUBIC YARD OF BRICKWORK.

1728 cubic inches equal 1 cubic foot. 46,656 cubic inches equal 1 cubic yard.

384 bricks, 4 courses to the foot.

360 bricks, 4 courses to 13 inches.

336 bricks, 4 courses to 13½, or eight layers of 42 bricks each.

1½ bushels of stone lime and 6 of sand, with joints averaging ⅜in. thick.

1 bushel cement or stone lime and 3 of sand, with joints averaging ¼-inch thick.

VARIOUS CONTENTS OF A ROD.

90¾ super yards equals one rod of 4½-inch brickwork.

45⅓ super yards equals one rod of 9-inch work.

30 2/9 super yards equals one rod of 18-inch work.

Bricks.—3672 bricks of 4 courses to 13½ inches, or ordinary brickwork;

Mortar.—3 to 1, 48 bushels of sharp sand, and 16 bushels or eight bags of stone lime.

27 feet cub. of mortar requires 9 bushels of lime and 1 cub. yard of sand, or 23 bushels.

6 to 1 Cement Mortar.—1 load sand = 21 cub. feet.

1 cask cement = 3½ cub. feet.

A cubic yard of sand is twenty-three striked bushels.

One cask of cement contains 3½ cubic feet or 4 cubic feet loose.

Water.—200 gals, for mortar and 400 gals. for wet bricks = 600 gals. at 1/6 per 1000 gals.—about 1/– per rod. Cement mortar only requires 162 gallons, or 3 hogsheads per rod.

A one horse dray load = 333 bricks.

A double load = 667 bricks.

1000 machine-made commons, average weight 3 tons 15 cwts.

Terms.—"**Commons**" for ordinary work.

"**Callows**" unbaked bricks. Suitable for interior walls.

"**Clinkers,**" overbaked and distorted bricks, suitable for foundations.

Sand lime bricks are made same size as shale brick, at Bondi.

Coke Breeze Bricks, same size as shale brick, are used chiefly as fixing bricks, built in.

Weight.—**Sandstock** bricks generally weigh 7lbs. each, or not less than 74 cwt. per thousand, say 13½ tons per rod, the mortar weighing about 3 tons at 24 cubic feet per ton. The rod of brickwork may therefore be considered to weigh about 16½ tons of English size bricks, or about 36 cwt. per cubic yard.

Sydney machine-made bricks weigh 8 lbs. to 8½lbs. each = 18½ tons per rod.

A rod of reduced brickwork will require about 170 hods of mortar.

Cost of a ROD OF BRICKWORK and Lime Mortar.

Bricklayers' wages, 24/– and Laborers' wages, 21/– per day.

Bricks at kiln: 3700 at 73/–; cartage 15/–, 88/–	...	£16	5 9
4 bags of lime, 8/–, 1½ cwt. each		1	12 0
4 loads of sand at 7/–		1	8 0
Water		0	1 0
Labor, laying 3700 at about 50/– per 1000		9	5 0
Net		£28	11 0

Openings not deducted.

Add scaffolding, cartage and profit.

Cost of a ROD OF BRICKWORK in Cement Mortar, Mixed 4 to 1.

Bricks as above, about 3700 at 88/–		£16	5 0
5 casks Cement, at 22/–		5	10 0
4 loads of Sand, at 7/–		1	8 0
Labor, 3700 at 60/– per 1000 and water		11	4 0
		£34	7 0

If grouted solid, will require two casks of cement mortar in addition to the above quantity.

At 4 of sand to 1 of cement it will take about 3½ casks to a rod of brickwork.

Having ascertained the price per rod as above, any alteration in the price of bricks can be allowed for at the rate of 3/9 per rod for each shilling per 1000. The proportions of cement or lime can also be varied as required.

Faced with O.K. Bricks.

Add extra cost of bricks. From £3 per 1000 extra or 1300, bricks, 44/–; labour extra, 16/–, 60/–.

Or (6/– to 12/– per 100) for 1224 face bricks contained in rod of 1½ vent inside, 16/– per vent.

If the brick facing or face bricks are measured separately, half the depth of the reveals are included in the measurement.

HOOP IRON FOR BONDING, &c.

(*Weight per Lineal Foot.*)

Gauge No.	Weight in lbs.	Width in inches.	Gauge No.	Weight in lbs.	Width in inches.
13	0.62 :	2	16 — $\frac{1}{16}$ in.	0.26	1½
14	0.47 :	1¾	17	0.21	1⅛
15	0.36 :	1½	18	.016	1
18	0.34 :	1⅜	19	0.12	⅞

	s.	d.
Hoop Iron, in bundles, of ½ cwt.... .. ... per cwt.	35	0

½-cwt. bundle, 1½ x $\frac{1}{16}$, called 16 gauge, contains 180 ft.

½-cwt. bundle, 1¼ x $\frac{1}{16}$, contains 210ft.

LABOR AND SCAFFOLDING.

Wages at 24/– per day, Per Rod, Reduced.

	£		£
Brickwork, garden wall bond, two faces	10	to	12
Brickwork in circular tanks, culverts, cess-pools or wells, ½-brick thick, including trammels and centres, from ...	12	to	14
1 brick or more in thickness, from	9	to	12
Brickwork in mortar for 4½in. walls	11	to	13
Ditto, do. for 9in. walls	9	to	12
Ditto, for 1½ brick walls	8	to	11
Foundations or for walls, 2 or more bricks thick	8	to	10

Extras.

Add if worked fair on both sides, per sup. rod	£1	0	0
Cavity walls	1	10	0
If in cement, add one-sixth			
If old bricks with bats are used, add...	£1	to 1 5	0
Cleaning and Stacking per 1000 bricks	£1	to 1 10	0

Add for mortar, cement or bricks, as per estimate.

The larger prices include flushing-up all joints.

LABOR AND SCAFFOLDING.

Per hour, 3/-; Bricklayer's Laborer 2/9.

Per Cubic Yard.

Bricklayers' wages, 24/–; laborers', 21/– per day.

	£	s.	d.		£	s.	d.
Bridges, abutments, etc., not less than 1½ brick thick					0	14	0
Arches, large culverts, or Skew bridges... ...					0	14	0
Ditto, or culverts, 1 brick thick					1	0	0
Ditto, or culverts, ½ brick thick					1	5	0
Ditto, lining to sewers, ½ brick thick					1	5	0
Piers, small and lofty, 4 sides plumbed... ...					1	16	0
Coppers, ovens, furnaces, cupolas, or ½ brick culverts	0	18	0	to	1	10	0
Factory Chimneys, square, any height below 60ft.	0	16	0		1	0	0
Ditto, circular, any height, to 4ft. flue	0	16	0		1	4	0
Ditto, circular, over 6ft. to 12ft. flue	0	12	0		0	16	0
Ditto, octagon, any height, or church spires ...	1	0	0		1	10	0
Brickwork in cement, with wet bricks, for curved arches, circular on plan, per cubic yard, from	3	0	0	to	5	0	0

Chimneys more than 60ft. high, add

2% for every extra foot.

If built from inside, deduct 10 per cent.

If in cement, add one-sixth to these items.

SUNDRIES.

Labor, per hour, 3/–, per foot run.

	s.	d.
Cuttings to 9in. rakes or ramps	0	6
Ditto, 14in., do. do	0	8
Ditto 18in. do. do.	1	0
Chamfering angles...	0	4
Cutting birdsmouth and squint	0	6
Raking out and pointing in cement to flashings	0	4

	s.	d.		£	s.	d.
Bedding and pointing sash and door frames ...	2	6	to	0	3	6
Fixing Chimney pots	2	6	to	0	3	6
Setting register stoves, complete				0	15	0
Ditto, colonial ovens, from				1	0	0
Labour setting laundry, 12 gal. copper, with wheel flue to chimney flue, finishing top in cement				2	0	0
Add for materials.						
Cutting out and bonding new work to old, toothing courses in mortar, per super ft.				0	1	0
Ditto, in cement mortar				0	1	6

Underpinning Walls.—Cutting away shale or old brickwork to 5ft. high, and rebuilding foundation footings, brick and cement, in lengths not exceeding 5 feet, labor only, per cubic foot, 2/–.

Cutting our brickwork, 1 course 9 inches wide in lime-mortar wall and inserting 2 layers of slates in cement above floor, per foot run, 5/–.

NEW DAMP COURSE INSERTED IN OLD WALLS.

Under floor reckon double according to cement, hardness of wall joints and cramped position, 20/– per foot run

Cost of cutting 9in. x 6in. ventilating holes through 9in. brick in lime mortar wall, and fixing 9 x 6 T.C. ventilator outside, and plaster vent inside, 16/– per vent.

To make new chimneys soot proof.—Mix ½lb. salt to bucketful of pargetting mortar.

BRICK MATERIALS.

Per 100 at Kiln.

	£	s.	d.
Bricks, common or ordinary bricks, Sydney firsts	3	10	0
Callows and seconds	3	7	0
Clinkers	3	4	0
Open Kiln ... ... face red £5 14 0 black	6	4	0
Open Kiln ... moulded headers £7 10 0 bullnose	6	0	0
Moulded Stretchers ... ... £8 15 0 common	7	15	0
Black Moulded Stretchers £9 5 0 common splayeds	7	5	0
Stops, single, 6d. each, double, 9d.			
Double bullnose ... ... 8 15 0 common ...	7	15	0
Chamfered or squints ... ... 8 15 0 splayed ogee	7	5	0

„ Rusticated bricks "rockfaced" cast at Lidcombe, near Sydney, "no tuckpointing required," £4 per 1000 at kiln.

FIRE BRICKS.

	£	s.	d.
English Fire Bricks, 9 x 4½ x 3in. ... ... per 1000 ...	12	10	0
„ Arch Bricks, side and end wedges „ ...	12	0	0
Colonial Bricks, 9 x 4½ x 3in. at kiln ... per 1000 ...	£6 to £10		
	According to quantity		
„ Arch Fire Bricks	7	10	0
Fire Clay, Colonial ... ... per cwt.	0	6	6
Oven Tiles, 12 x 12 x 2in. ... ... each	0	2	0
Fire Lumps, Bakers' Ovens Sets, Colonial made—45/- set. arge blocks			
1 of 36 x 12 x 6in. 1 of 32 x 12 x 6in. ... ... 3 of 18 x 12 x 6in.	2	10	0
Equals 10ft. at 5/-.			
Best English Oven Sets	3	0	0
Common, at kiln	3	10	0

For quantities, *see Advt. pages* 2 and 18.

VENTILATED AIR BRICKS.

For Brickwork.	per doz.	For Woodwork.	per doz.
9 x 6 terra cotta ...	11/-	9 x 6 tin louvres	8/-
9 x 6 hooded	26/-	9 x 6 cast zinc louvres ...	44/-
9 x 6 louvred terra cotta	26/-	9 x 6 cast zinc hit-n-miss	36/-
9 x 6 plaster vents, internal	9/-	9 x 6 stamped steel ...	13/-

Galv. Iron Wall Ties, per 1000, 12/-.

Lime 2½ bushels per bag, 200 lbs., 8/- or 15 to 16 bags per ton.

Cement per bag of 125lbs., 7/6, or 22/- per cask, about 3½ cwt.

Sand, Sydney, per load, 7/- to 9/-, river sand per ton, 12/-.

Plaster of Paris, 42/- per cask, Diamond Brand Australian in bags, 9/6.

CONTRACT PRICES OBTAINED.

Common Bricks at 85/- per 1000; O.K., 114/-; Cartage 10/-.

	per rod. £	s.	d.
Brickwork, in mortar, including arches in cement, 3 to 1 ...	29	10	0
Ditto in cement	35	0	0
Brickwork in mortar, hollow walls and ties	31	0	0
Brickwork, in cement	36	0	0
Extra to above—			
Facing O.K. bricks, per square yard — 40 bricks at 43/-, work extra	0	5	3
Struck joints, per square yard	0	0	6
Tuck Pointing new work, including coloring, per square yard	0	2	6
Ditto, old work, ditto, and raking out, per square yard ...	0	3	6

POINTING.

Labor and "All Materials," per yard super.	s.	d.
Flat joint or white pointing, including raking out and scaffolding	2	6
Ditto, to chimney shaft, do. up to 50ft. high	3	6
Tuck pointing to new work and scaffolding	2	0
Ditto, to old work, including raking out, cleaning, staining and scaffolding	3	6
Cleaning down walls, per 10ft. square with diluted spirits ...	3	0
Country work, per yard, tuck pointing	3	6

BRICKLAYERS' AWARD, 1924.

Fares paid over 4d. per day to jobs, city and suburban work, 2/10½; country work, 3/-; 44 hours per week.

PAVING.

Labor, etc., per yard super.

1924 Award, 2/10½.

Bricks at Kiln, 70/- per 1000; Cement at 7/-.

	Lime or cement s.	d.	Labor. s.	d.
32 **Bricks** flat in sand, laid straight or herring-bone ...	0	3	1	6
41 ditto, on edge, in ditto	0	4	2	0
32 ditto, flat in mortar and jointed do.	0	7	2	6
41 ditto, on edge, do.	0	10	3	6
If laid flat in cement, add on mortar	0	4	0	8
Ditto, on the edge	0	5	1	8
8, 9, 10, or 12in. tiles, in cement mortar	3	6	3	0

Paving Material, per square yard—

Calculating Bricks at 70/- per 1000.

Add 2/6 on flat; 3/- on edge to above.

One bag cement, 8 cubic feet of sand, for grouting 6 yards.

Paving for water channels or open drains, add from one-fourth to one-half for extra labor.

MATERIALS REQUIRED TO BUILD BRICKWORK.

In examples of estimating I have varied the prices of materials slightly, as they fluctuate according to the monthly trice lists issued.

Ordinary W.B Cottage Kitchen Chimney of the following dimensions :— Fireplace 3ft. 6in. wide x 18in. deep, with 9in. back and sides; 5ft. x 10ft. front, 16ft. to top of chimney, with foundation :—

	£	s.	d.
Bricks—1000 at 70/-	3	10	0
Lime—1½ bags at 8/-	0	12	0
Sand—1½ loads at 7/-	0	10	6
Cement—½ bag, 3/6	0	3	6
Scaffolding and labor to above	5	10	0
Add for cartage to job.			
	£10	6	0

For W.B. or "Durabestos" Cottage.

Usual Double Chimney, with 5ft. breasts, 10ft. high, 18ft. to top of double chimney :—

	£	s.	d.
Bricks—1500 at 80/- delivered	6	0	0
Lime—2 bags at 10/-	1	0	0
Cement—½ bag, 3/-; 2 bars, 5/-	0	14	0
Scaffolding and labor to above	9	7	0
Net	£17	1	0

Kitchen Chimney, 6ft. wide overall at bottom, and bottle stack 14ft high; brick foundations overall 6ft. 9in. x 3ft. 9in.; fireplace. 4ft. 6in. wide, 4ft. x 27in., 9in. back :—

	£	s.	d
Bricks—900 at 80/- per 1000	3	12	0
Lime—1¼ bag at 9/-	0	11	0
Sand—1¼ load at 7/-	0	9	0
Scaffolding and labor	6	8	0
Net cost	£11	0	0

Ordinary Brick E.C., 4ft. 6in. x 3ft. 6in. x 8ft. high inside x 4½in, walls :—

	£	s.	d.
Brickwork—750 at £7/10/- per 1000 laid ...	5	12	6
Floor—Concrete, 2 yards at 10/-	1	0	0
Roof—Galvanised Iron, 3 of 7ft. sheets at 4/- ...	0	12	0
Rafters—Plates and fixing	1	5	0
1in. T. and G. ledge door, 20/-; lock, 4/-; louvres, 10/-; labor, 20/-	2	14	0
Pan, 8/-; seat, 10/-; fixing same, 8/6	1	6	6
Painting door and coloring walls	1	0	0
Net cost	£13	10	0
For W.C., add cost 6in. G.E. drain pipes to sewer and plumbing work	7	0	0
If walls are 9in. thick add	5	0	0

Setting Washing Copper, with chimney 12ft. high :—

	£	s.	d.
Bricks required, 450, 80/-; lime, ½ bag, 4/6; sand, ½ load, 7/-	4	11	6
Labor to above about	3	0	0
Net cost	£7	11	6

Setting Washing Copper (see prices if they have fluctuated according to the stock exchange on copper).

With wheel flue in corner of building :—

	£	s.	d.
Bricks, 250, 20/-; lime, 2/6; sand, 4/6, and cement, 2/6	1	11	0
Labor to above about	1	4	0
	£2	15	0
Add 12 gal, copper, 35/-, door and grate, 5/- about	2	0	0

Reinforced Brick in Cement Lintels over ordinary 3ft. door or window openings may be built in flat courses, with three layers of the special reinforcements of expanded metal "Exmet," or steel-wire-mesh "Brictor."

In all cases, with or without the reinforcement, a close heading joint must be kept in brickwork over openings, and a rigid support maintained till the cement has thoroughly set and dried.

REINFORCED LINTELS AND BEAMS.

Coke Breeze and Blue Metal Reinforced Lintels, per foot run.

	Breeze	Blue Metal
6½in. x 4½in. thick, 2 courses of brickwork ...	–/10	1/3
9½ in. x 4½in. thick, 3 courses of brickwork ...	1/3	2/–
Over 8 ft. long	1/6	2/3
13½in. x 4½in. thick, 4 courses of brickwork ...	1/9	2/9
Over 10 ft. long	2/6	3/–

Lintels faced Smooth, 6d. per lineal foot extra.

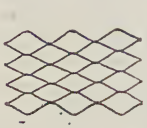
Special lintels for partition blocks, 2 courses, 1/–.

3 courses, per foot run, 1/6.

BRICK-WORK REINFORCEMENTS.

"**Exmet**" is an expanded steel production, consisting of a fine integral mesh, 20 to 24 gauge steel, similar to Plasterers' Lathings, in rolls 2½in. wide, dipped in Asphaltum paint.

Sold in Coils 270-ft. long, from 14/– per Coil.



270ft. Coil.	weight. lbs.
24-gauge	14
22-gauge	18
20-gauge	23

"**BRICTOR**" is a wire mesh reinforcement, made in Sydney, and Melbourne, in rolls 75ft. and 150ft. long, galvanized, must be laid in cement mortar.

	Price per Roll. 75ft. Roll.	150ft. Roll.
1½ wide	6/–	12/–
2½ wide	8/6	17/–

(*See agent's advt., pages* 2, 7, 11, 24.)

Breeze and cement bricks to build wall in lieu of plugging can be made in long mould by hand mixing.

CIRCULAR TANKS, WELLS, SHAFTS, OR CULVERTS.

Table showing earth to be removed, number of bricks (4 courses to 13½ inches), and contents in gallons: at 60s. per cube yard for brickwork in cement (1 to 2), for each foot in depth.

Clear diam. ft. in.	Half-brick Thick.			One Brick Thick.			Gallons per foot in depth.
	Earth cube ft.	Bricks per ft.	Cost at 60/-	Earth cube ft.	Bricks per ft	Cost at 60	
2.3	7	40	7.4	11	90	16.8	24.6
2.6	9	44	8.0	13	99	18.4	330.6
3.0	12	51	9.6	16	112	21.0	44.0
3.6	14½	59	10.10	20	128	23.8	61.0
4.0	18	65	12.2	24	142	26.4	73.3
4.6	22	73	13.1	28½	157	29.0	99.1
5.0	26	80	15.0	33½	170	31.8	122.3
5.6	31	88	16.4	38½	185	34.8	148.0
6.0	36	95	107.0	44½	200	37.0	176.2
6.6	41½	103	115.0	51	214	39.8	206.8
7.0	48	110	123.0	57	248	39.8	239.8
8.0	61	124	140.0	71	255	47.8	313.2
9.0	75	133	150.0	87	278	51.8	396.5
10.0	91	141	160.0	104	300	56.8	489.5

Semi-circular domes contain the same number of bricks as an equal height of the sides or barrel, *e.g.*, a semi-circular dome of 10ft. diam. and one brick thick contains 340 x 5 = 1700 bricks.

The price given for tanks, &c., one brick thick, would include the excavation in earthwork at Sydney or Melbourne prices.

When calculating bricks by the above table, deduct one-tenth from number of bricks stated for ordinary machine bricks.

Current price per cubic yard to be ascertained, as per page, and the difference allowed for as per table, *e.g.*, if 50s., reduce one-sixth.

Square.—If brickwork was reckoned by the square the measurement and calculation would be greatly simplified.

Labour only.—Doorways and other openings are not deducted, except more than 36 superficet each when half the area is deducted for labour only.

Terms Used

"Lime (or cement and mortar" includes scaffolding, centering moulds, templates, and all materials except bricks.

"All material" includes lime and mortar and bricks, when all openings are deducted in the measurement and arches, &c., allowed for. This is the English and standard method

Circular Tanks and Shafts.

Bevelled Bricks are sometimes used for small wells and tanks by which the labour of cutting the ends of the bricks is saved, and a finer joint obtained. If built with half brick rim the inner face of 9 inch bricks will measure as follows, viz. :—

Clear diam.		Clear diam.		Clear diam.	
Feet	Inches.	Feet	Inches.	Feet	Inches.
$1\frac{1}{2}$	6	3	$7\frac{1}{4}$	$4\frac{1}{2}$	8
2	$6\frac{1}{2}$	$3\frac{1}{2}$	$7\frac{1}{2}$	5	$8\frac{1}{8}$
$2\frac{1}{2}$	7	4	$7\frac{3}{4}$	6	$8\frac{3}{8}$

Circular Tanks and Shafts.

Table showing earth to be removed, number of bricks (4 courses to 13 ins.), and contents in gallons for each foot in depth; also number of bricks in semi-oval domes, with rise equal to one quarter the span.

Clear diam. feet.	One Brick Thick			One and a half brick thick.			Gallons each foot in depth.
	Earth cubic feet.	No. of Bricks.		Earth, &c. cubic foot.	No. of Bricks.		
		Semi-oval dome.	Each foot in depth.		Semi-oval dome.	Each foot in depth.	
10	104	900	350	118	1490	540	409
11	123	1070	380	138	1770	590	594
12	144	1280	410	160	2090	640	706
13	164	1470	440	183	2390	690	831
14	184	1670	471	208	2700	740	962
15	214	1900	503	234	3100	709	1106
16	241	2160	535	262	3520	835	1256
17	269	2470	566	292	3980	885	1419
18	299	2780	597	323	4400	930	1589
19	331	3080	628	355	4880	975	1775
20	364	3400	650	389	5400	1025	1963

N.B.—The above domes are intended to be circular on plan and semi-oval in section, with man-hole in the centre. The 10 feet semi-oval dome requires only 900 bricks, while the semi-circular dome, of the same diameter, requires 1800 bricks. This English brickwork table is reckoned 10 bricks to the sup. foot (one brick thick). It will also be found that circular domes contain the same number of bricks as an equal height of the tank they cover provided they are of the same thickness.

Bricks and lime or cement will not properly combine unless the bricks are soaked with water immediately before being used. If this is done the work will never give way in the joints. A similar, but less effective result, may be obtained by watering dry walls before the mortar or cement is set, or partially so by grouting.

Deduct one tenth from above numbers for 3675 machine made bricks to the reduced rod, as the brickwork of Sydney and Melbourne generally averages 9 bricks to the super. foot, one brick thick.

TABLE SHOWING THE NUMBER OF BRICKS REQUIRED FOR WALLS *of all areas at* 4,080 *bricks per red ced rod.*

Area of wall.	Bricks thick and bricks required.				
	½-brick.	1-brick.	1½-brick.	2-bricks.	2½-bricks
1	5	10	15	20	25
2	10	20	30	40	50
3	15	30	45	60	75
4	20	40	60	80	100
5	25	50	75	100	125
6	30	60	90	120	150
7	35	70	105	140	175
8	40	80	120	160	200
9	45	90	135	180	225
10	50	100	150	200	250
20	100	200	300	400	500
30	150	300	450	600	750
40	200	400	600	800	1,000
50	250	500	750	1,000	1,250
60	300	600	900	1,200	1,500
70	350	700	1 050	1,400	1,750
80	400	800	1,200	1,600	2,000
90	450	900	1,350	1,800	2,250
100	500	1,000	1,500	2,000	2,500
200	1,000	2,000	3,000	4,000	5,000
300	1,500	3,000	4,500	6,000	7,500
400	2,000	4,000	6,000	8,000	10,000
500	2,500	5,000	7,500	10,000	12,500
600	3,000	6,000	9,000	12 000	15,000
700	3,500	7,000	10,500	14,000	17,000
800	4,000	8,000	12,000	16,000	20,000
900	4,500	9,000	13,500	18,000	22,500
1,000	5,000	10,000	15,000	20,000	25,000
2,000	10,000	20,000	30,000	40,000	50,000
3,000	15,000	30,000	45,000	60,000	75,000
4,000	20,000	40,000	60,000	80,000	100,000
5,000	25,000	50,000	75,000	100,000	125,000
6,000	30,000	70,000	90,000	120,000	150,000
7,000	35,000	70,000	105,000	140,000	175,000
8,000	40,000	80,000	120,000	160,000	200,000
9,000	45,000	90,000	135,000	180,000	225,000
10,000	50,000	100,000	150,000	200,000	250,000
20,000	100,000	200,000	300,000	400,000	500,000
30,000	150,000	300,000	450,000	600,000	750,000
40,000	200,000	400,000	600,000	800,000	1,000,000
50,000	250,000	500,000	750,000	1,000,000	1 250,000

Deduct one-tenth from above numbers from 3675 machine, Australian-made bricks to the reduced rod.

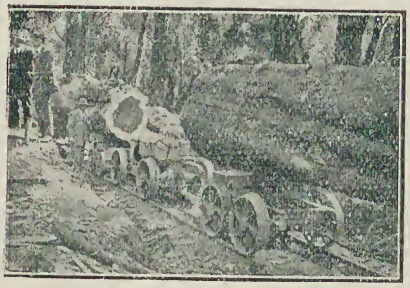
Table showing the value from One, to Two Hundred and Seventy-two Feet of reduced Brick Work, from £3 to £12 per Rod.

Feet.	At £3 per Rod.			At £4 per Rod.			At £6 per Rod.			At £8 per Rod.			At £10 per Rod.			At £12 per Rod.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	2½	0	0	3½	0	0	5	0	0	7	0	0	9	0	0	10½
2	0	0	5	0	0	7	0	0	10½	0	1	2	0	1	5½	0	1	9
3	0	0	8	0	0	10½	0	1	4	0	1	9	0	2	2	0	2	7½
4	0	0	11	0	1	2	0	1	9	0	2	4	0	2	11	0	3	6
5	0	1	1	0	1	5½	0	2	2	0	2	11	0	3	8	0	4	5
6	0	1	4	0	1	9	0	2	8	0	3	6	0	4	5	0	5	3½
7	0	1	7	0	2	1	0	3	1	0	4	1	0	5	2	0	6	2
8	0	1	9	0	2	4	0	3	6	0	4	8½	0	5	10½	0	7	0½
9	0	2	0	0	2	8	0	3	11½	0	5	3½	0	6	7	0	7	11
10	0	2	3	0	2	11	0	4	5	0	5	10½	0	7	4	0	8	10
15	0	3	4	0	4	5	0	6	7	0	8	10	0	11	0	0	13	3
20	0	4	5	0	5	10½	0	8	10	0	11	9	0	14	8½	0	17	8
25	0	5	6	0	7	4	0	11	0	0	14	8½	0	18	4½	1	2	0½
30	0	6	7	0	8	10	0	13	3	0	17	8	1	2	1	1	6	6
40	0	8	10	0	11	9	0	17	8	1	3	6	1	9	5	1	15	3½
50	0	11	0	0	14	8½	1	2	1	1	9	5	1	16	9	2	4	1
60	0	13	3	0	17	8	1	6	5½	1	15	3½	2	4	1	2	12	11
70	0	15	5	1	0	7	1	10	10½	2	1	2	2	11	5½	3	1	9
80	0	17	8	1	3	6	1	15	3½	2	7	0½	2	18	10	3	10	7
90	0	19	10	1	6	5½	1	19	8½	2	12	11	3	6	2	3	19	5
100	1	2	1	1	9	5	2	4	1	2	18	10	3	13	6	4	8	2
110	1	4	3	1	12	4	2	8	6	3	4	8	4	0	10½	4	17	0½
120	1	6	6	1	15	3½	2	12	11	3	10	7	4	8	3	5	5	10½
130	1	8	8	1	18	3	2	17	4	3	16	5½	4	15	7	5	14	8½
140	1	10	11	2	1	2	3	1	9	4	2	4	5	2	11	6	3	6
150	1	13	1	2	4	1	3	6	2	4	8	3	5	10	3½	6	12	4
160	1	15	4	2	7	0½	3	10	7	4	14	1	5	17	8	7	1	2
170	1	17	6	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0
180	1	19	9	2	12	11	3	19	5	5	5	10½	6	12	4	7	18	10
190	2	1	11	2	15	10½	4	3	10	5	11	9	6	19	8	8	7	8
200	2	4	1	2	18	10	4	8	3	5	17	8	7	7	0½	8	16	5½
210	2	6	4	3	1	9	4	12	8	6	3	6	7	14	5	9	5	3½
220	2	8	6	3	4	8½	4	17	0½	6	9	5	8	1	9	9	14	1
230	2	10	9	3	7	8	5	1	5½	6	15	3½	8	9	1	10	2	11
240	2	12	11	3	10	7	5	5	10½	7	1	2	8	16	5½	10	11	9
250	2	15	2	3	13	6	5	10	3½	7	7	0½	9	3	10	11	0	7
260	2	17	4	3	16	5½	5	14	8½	7	12	11	9	11	2	11	9	5
270	2	19	7	3	19	5	5	19	1½	7	18	10	9	18	6	11	18	3
272	3	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0

By adding, halving, or doubling, as may be requisite, any quantity or value can be obtained from the above Table.

BUSH WORK.

Transport of logs through established timber country (*where the rich loamy ground is soft and boggy*) to the open, or depot, is now done by a light railway or traction engines of motor powers, at a cost from –/6 per mile per ton in the log for haulage, according to grades and quantity. *See* Cost of Traction Engines Section.



Labor.—Felling trees, cutting off and piling branches for burning on clear country per acre.

Example.—Average 12 inches diameter at cut say "green" grey gum, or stringy bark, *straight easy grain.*

One tree, one man per 1½ hour each, wages — 2/6. per hour.

say 20 feet apart — 110 trees to the acre, about £21 per acre net.

40 feet apart — 27 to the acre, ditto, 3/9 each — about £5/10/– per acre.

Uprooting and burning off £1 per tree — £27 per acre.

Add for scrub and undergrowth according

18 inch diameter trees, reckon double or 7/6 each.

2 feet diameter trees, reckon three times, or 11/3.

One acre of land, square block, contains 150 feet x 290 feet, or 100 feet x 430 feet, or 200 feet x 218 feet. *See* Table.

NUMBER OF TREES TO THE ACRE.

4 feet apart		2720	10 feet apart		430	20 feet apart		110
5	,,	1749	12	,,	325	22	,,	70
6	,,	1200	15	,,	200	30	,,	44
8	,,	689	18	,,	135	40	,,	26

Bush Hardwood Timber.—In choosing trees for sawn timber, posts, slabs, &c., avoid those with dead branches, or hollow pipes, which are often an indication of decay or hollow trunk, when the trees otherwise appear sound.

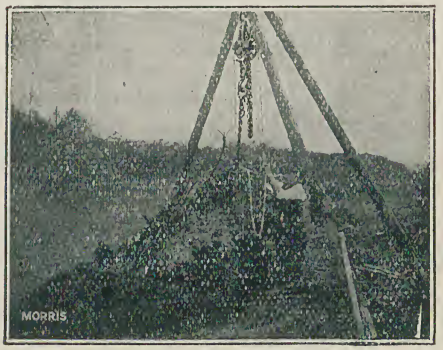
In **Splitting** H.W. or ironbark, the slabs, posts, &c., are split parallel with the rings, and generally thin out towards the top, but in stringy bark and mess-wood, swamp mahogany, the slabs are generally split in radiating lines from the centre outwards, and in this manner have been split 2ft. wide by 5ft. long.

To Test Soundness of Timber.—Place the ear close to one end of the timber while attendant strikes the other end with a hammer. If the sound is ringing and clear, the log is good, but if dull there is some flaw or unsound spot.

TO DESTROY OR CONSUME TREE STUMPS.

Bore a hole with a 2in. Auger into the stump from the top. Pour a pint of mixture of nitric acid and sulphuric acid, equal parts, and close the hole with a waxed plug. A stump, roots and all, thus treated will be rotten in 30 days.

Another Method.—At the end of summer, into a 1in. bored hole, put 2-oz. of saltpetre, fill with 18in. of water and plug tight. In three months fill the hole with kerosene. When lighted the stump and roots will smoulder away.



Uprooting trees by tripod and Endless chain differential pulley.

MEASUREMENT OF AN ACRE OF LAND.

IN SQUARE ANGLE BLOCKS.

Width	Length	Width	Length	Width	Length	Width	Length
Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
20	2,178	120	363	210	207	320	136
30	1,459	130	336	220	198	340	128
40	1,085	140	312	230	189	360	121
50	875	150	290	240	181	380	114
60	725	160	272	250	174	400	109
70	622	170	250	260	167	450	96
80	545	180	242	270	161	500	87
90	484	190	224	280	155	550	79
100	436	200	218	290	150	600	73

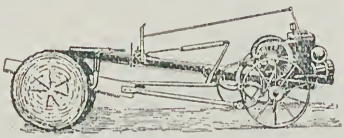
THE AUSTRALIAN "NEW RECORD" BUSH CROSS CUT SAW.

A One Man Portable Draw Saw, made strong for rough bush conditions in felling and cutting up trees for splitting sleepers, fencing posts and rails, etc.

Equipped with a belt driven 2 h.p. four cycle hopper-cooled oil engine with governor and magneto ignition.

1 gallon of fuel for 8 hours' work.

This plant will cut down any tree up to 7 feet diameter, from ground level to 4 feet above, and cross cut it up to lengths without digging.



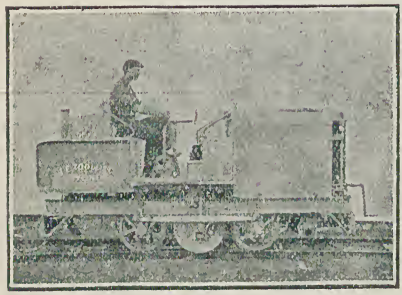
Shifting of machine for fresh cut, 3 minutes. The blades are adjustable from horizontal to upright.

Plant complete on 3 feet steel wheels with 4 inch tyres, for easy transport. Price complete, £75.

Extra tree-felling attachment, £15.

Saw Blades, 5, 6, to 7 feet long, at 12/6 per foot.

See advt. pp. 19, 44 or Engineer and Saw Mill Supply Co. Ltd., 32 Chrome St., Sydney; Brown, Prior & Co., 420 Little Bourke St., Melbourne.



Benzine or kerosene oil driven motor for light railway. Hauling capacity 20 tons.

18 inches gauge and upwards. Approx. price, £1000.

Weight 3½ tons hauls 20 tons over grade 1 in 8 Fuel, 1½ gals. per hour, average 8 miles run, –/5 per ton for 8 miles. Wages and overhead cost.

1 pint per horse power per hour, full speed 10 miles per hour.

(*See Advt. p.* 19.)

CLEARING ROADS OR DRAINS.

(Through Ti-Tree Scrubs.)

Scrub-Cutting Roller, drawn across fallen scrub. Worked with side draught. 10ft. roller, with knives, cuts about 8 acres per day, according to thickness of scrub and size of block. Saves about 30/– per acre. Scrub is cut twice and burns up clean ready for ploughing. Ti-tree sticks up to 4 inches in diameter can be smashed down and cut. Rollers made in sizes to suit. Prices and particulars on application. From £11. Meadow Bank Works, Sydney.

RAILWAY SLEEPERS.

The best sleepers are those hewn from blackbutt, red gum, grey gum, grey box, woolly butt. The trees should be barked and allowed to die before they are felled, by which means they become partly seasoned; the season for falling Australian timber is from March to September, when the sap falls; it should then be split or sawn and stacked in the shade in such a manner that it may be *well ventilated*; but with every precaution, the ends will open more or less; this may be partly stayed by bolting them or painting ends with whitewash, clay, etc. It would be worse than useless to tar unseasoned timber which would only hasten its decay by preventing the sap evaporating. These remarks apply to all kinds of Australian timber and for all purposes. *Floor timbers* and boards should be stacked and seasoned in the shade, with thin separating fillets between boards to admit air.

SLEEPER GETTERS.

Prices in N.S.W. Association.

Ironbark, 9 feet long, regulation size, 10/6 each; 8 feet long, 6/– each;
Hardwood, 9 feet long, regulation size, 9/6 each; 8 feet long, 5/6 each.

	s.	d.
Additional Cost—Transport to railway 2 miles away.		
Loading, cartage, and unloading, for first mile per sleeper ...	1	0
Boring sleeper, 9 inches, wide at both ends	0	8
Riveting sleeper, with ½in. iron rivets	0	6
Removing from heap and re-stacking	0	8
	2	10
Add price of 8ft. sleeper on the whole net cost, Box or Gum...	5	6
Each ...	8	4
Adzing sleepers for permanent way, per 100 ... ... £1	17	0

The above sleepers average about 14 to the ton.

Red gum, ironbark and box sleepers last from 12 to 15 years.

Messmate and stringy bark sleepers last only 5 or 6 years.

Hardwood from Pyrmont Bridge was sound after 15 to 20 years.

Number of Nails in a 7lb. packet—

1225 nails in 7lb. packet, 1¾ x 11 gauge.

300 nails required for nailing 1 square flooring boards, 6 x 1, T. & G. or 7lb. pkt. = 4 squares nail 6in. x 1in. boards, No. 21 boards to 10ft. wide, as under.

LABOR ONLY.

Split Slabs, Posts, and Rails.

Labor at 2/3 per hour.

	Per 100 count. £	s.	d.
Felling, splitting ironbark slabs 5½ft. x 11½in. x 1½in. ...	2	10	0
Ditto, stringy bark slabs, ditto	2	0	0

Getting Posts and Rails.

Stringy bark or gum, 7ft. x 9in. x 4in., and rails 9ft. x 6in. x 3in.	2	0	0
Felling, sawing, and splitting hardwood posts and rails (as per last item), for 3-rail fencing, at per rod	0	4	0

Fencing, per rod, labor only, 7/– to 9/–.

Cartage of 25 posts and 75 rails (scantling as above, weighing 3 tons) for first mile, including loading and unloading, by team	0	8	0
Ditto, for each additional mile	0	3	0
H.W. split posts, 8 ft. long, at mill, City, price each ...	0	3	0
Labour, Mortising posts, adzing rails, sinking holes, and putting up 3-rail fence, complete, per rod, 16ft. 6in.	7	0	
Nailing 5ft. (*narrow space* ⅛) paling on ditto	1	6	
Ditto, wide (*close paling*), 6 nails each, on ditto	2	0	
Labour	10	6	

Example—Split Paling Fence.

5ft. high, split posts and 2 rails.

Supplied from Timber Merchants, Sydney.

2 Split Posts, 7ft., 3/– each	6	0	
50 Palings at 36/– per 100	18	0	
2 rails, 16ft. each, = 32ft. at –/3	7	0	
33ft. of Hoop Iron, 1/6, nails, 200 1½in., – 1/6	3	6	
	35	0	
Labor per rod	8	0	
	43	0	

If without palings, deduct 20/–.

ROUGH TIMBER BRIDGES.

Labor in bush.

Bridge Carpenters' Award, 1922, 2/6 city, 2/11 country, per hour.

Hardwood.	s.	d.
Felling, trimming, and barking gum or box, for piles, bearers, struts, &c., from 15 to 18 inches diameter, and from 20 to 40 feet long, per lin. foot	1	8
Rough adzing and squaring ditto, ditto	1	6
Pile-driving in clay, sand, loose gravel, &c., ditto	3	6
Hoisting, framing, fixing, bolting, &c., ditto, per lineal foot ...	3	0
	9	8

Sawn planking, railings, guard rails, &c., fixed and bolted, complete ... ... per cub. foot 5 7
Wrought hand-rails, &c., framed and fixed, complete, per cub. ft. 7 6
Add bolts, straps, &c., per lb., from ... ... 6d. to 0 8

Example—Planking 3in. thick, per square, viz., 10 feet x 10 feet.

	per 100 s. ft. s.	d.
14 planks of 10ft x 9in. x 3in. = 315 sq. ft. at 24/– = per 100 ...	75	7
Labor, laying, per square	42	6

THREE PLY TIMBER SHEETS, 6ft. x 3ft.

	Per 100 sq. ft. Sanded	
	One side	Two sides
Oregon, $\frac{3}{16}$in. thick	40/–	65/–
Queensland Maple	65/–	78/–
Queensland Hoop Pine...	22/–	
Oak	67/6	75/–
Pieno	50/–	...

See Labor, fixing these sheets, same as the beaver board and asbestos cement sheets.

QUEENSLAND MAPLE PLYWOOD (Knife Cut).

This process of cutting shows the beauty of the figure and the ribbon grain, is exquitisely retained.

Used for panelling and furniture and interior decoration. In sizes 5 x 3 and 6 x 3, at 80/6 per 100 sq. ft.

To make the position of **wooden plugs** show through plaster on wall, spray the wall with water by syringe or a brush when dark spots will appear at positions of plug.

The Rawlplug and electric hammer drill have superceded the old fashioned plug in joint. *See advt., p.* 8.

Beaver Board, a compressed pulp board for interior use, in length 6 to 16 ft. x 2 to 4 ft. wide. 30/– per 100 sup. ft.

Cornell wood fibre, a hard compressed board, in sheets 7 to 16 ft. long x 3 and 4 ft. wide, 27/6.

6 spikes to each plank = 84 count of 7in. spikes (*refer to Smith's table*) = 32lbs. at 22/– at per cwt.	6	6
Waste and incidentals, 10 per cent.	15	5
per square	140	0

As four thicknesses of 3in. planking would be one foot thick, 100 cubic feet would cost 560/–, or one cubic foot (*as per above*) net cost ... per cubic foot 5 7

H.W. WHARFS, JETTIES, BRIDGES, PILING, GIRDERS AND PLANKING.

First-class Construction, 2/6 per hour.

	s.	d.
Hardwood round piles (vertical), from 20 to 40 feet long, driven complete, per lin. foot	6	0
Ditto, raking ditto, or vertical sheet piling, per lin, foot. ...	7	6
If in shallow water, or if more than 40ft. long, add labor ...	2	6
Labour in pile driving, including staging, &c., per lineal foot, from ... ... 2/6 to	4	0
Hardwood, sawn, bolted and fixed in walings, braces, collars, struts, straining pieces, corbels, girders or joists, per cub. foot	7	6
Hardwood, wrought, framed, and chamfered in stanchions, sills, diagonal braces, hand-rails, &c....	10	0
Hardwood, rough, wrought and splayed, in guards, fenders, &c., per cubic foot	9	0
Hardwood 4in. planking, in roadway, &c., laid and spiked, 3/9 ; 3in. ditto, per cubic foot	6	0
Ditto, 2in., ditto in footways, &c., ditto	7	0

The above items include the fixing only of all ironwork, in piles, &c. ; also hardwood within 2 miles.

Ironbark Piles from 20 to 50 feet long, and 12 to 18in. diameter per lineal foot, in Darling Harbour, Sydney, from 2/6 to 4/6.

Laminated Bridge of 70ft. span and 16ft. wide, 4 arched ribs each, with four 10 x 4 beare s on raking piles, etc., for springing, cost about £12 per lineal foot, and large strutted bridges about £20 per lineal foot complete.

RAILWAY BUFFER FRAMES.

For " dead ends " of tracks.

	s.	d.
Hardwood curbing, uprights, heads, sills, struts, sleepers, &c., framed, housed and bolted, labor only, at per cub. ft. ...	6	0

Iron work to be charged by the pound.

RAILWAY GATES N.S.W.

	£	s.	d.
8ft. x 12in. dia. blockwood round capped posts ...	2	10	0
10ft. gates, including hardwood struts, ironwork, painting and hanging complete, about	60	0	0
12ft. gates, ditto, ditto, ditto	70	0	0

CARPENTER.

MEASUREMENT.

Timber is generally measured by the 100 feet super.

The superior kinds, such as cedar, mahogany, rosewood, Tasmanian blackwood, veneers, and joinery, &c., by the super foot.

The labour is by the 100 feet square of piecework, such as studs, battens, shingle, T. and G. and other partitions, joisting and flooring, framing, roofing, ceiling, and weatherboards.

It will be a saving of time when estimating to form cost price per square (locally), including allowance for waste on lengths.

Round timbers, for **woolsheds, stockyards**, corner posts, telegraph poles, by the piece.

Bridge and small wharf piles are by the pole or single piece.

Larger piles, over a foot in diameter, struts and beams, by cub. foot.

Ceiling, slate, and wall battenings, by the 100 square feet, viz., 10ft. x 10ft.

See Quantities and Measurements, page 17.

RULES FOR MEASUREMENT.

The Surface work of joinery, per super. foot is accentuated by every angle or determination, according to frequency.

Circular work of every description in Joinery to be charged as follows, viz. :—

Flat Sweep, not more than ½-inch rise per foot, or curves of circles not less than 3 feet diameter, once and a half the price of straight work.

Quick sweep or Eliptical, or more than ½-inch rise per 12-inch chord, twice the price of similar straight work ; the same, according to sharpness of the curves.

The above proportions apply to the shape on the plan or to the elevation only.

If they occur on both plan and elevation as circular, they must be reckoned twice or three times the price of circular on plan only, *e.g.*, if flat sweep on both plan and elevation, the proportion would be 1½ x 2 — 3 times the price of straight work.

If quick sweep on both plan and elevation, the proportion would be 2 x 3 — 6 times the price of similar straight work.

If flat sweep on plan and quick in elevation, 4½ times.

If quick sweep on plan, and flat in elevation, 4 times the price of similar straight work.

MEASUREMENT—CARPENTER & JOINER.

Circular sashes, frames, shutters, &c., to be measured square, and circular heads to doors, &c., to be measured square above the springing, which gives an addition of 21½ per cent. on the net measurement, exclusive of the extra charge determined by the previous Rules.

Circular, plain glued in thickness, for all degrees of curvature take twice the price of similar straight solid work, and if circular from 3 to 4 times, according to sharpness of curves.

Cornices.—In measuring cornices the mouldings, the foot run is to be taken, according to width of traversed surface, &c., as the case may be.

THE COST OF LABOUR TO JOINERY—Comparative.

Taking **clear pine** as a standard—

"**Joinery**" **Cregon**, fine grain, picked, 10 per cent. more than clear pine.

Cregon (stock) and cyprus pine, 15 per cent. more than clear pine.

Cedar, Huon Pine, &c., is about 25 per cent. more.

Tasmanian Blackwood, Queensland Maple, is 35 per cent. more.

Oak, American Walnut, Teak, Japanese Oak, 35 to 50 per cent.

Jarrah and Aus. Hardwoods, from 50 to 75 per cent. more.

HARDWOOD GIRDERS.

Hardwood Girders—Mill Prices per 100ft. super.

	s.	d.
Heavy Scantling, 4in. to 6in. x 12in. to 30ft. long	45	6
Tallowwood, ditto, 28/–; Spotted gum, ditto	42	6
H.W. Deck Planking, 2½in., 3in. 4in. thick, to 12in. wide ...	36	0

Oregon Girders, up to 30ft. long.

15in. x 15in. and over, up to 18in. x 18in., per 100 sq. ft. ...	38	0
H.W. Paving Blocks, range of sizes, 5in., 6in. to 10in. x 3in. thick, per 100 super	40	0

See Roads Section.

The items of costing are taken from the Monthly Timber Merchants Price Lists and the labour at 2/6 per hour, generally as a basis. Any difference can be adjusted by per centage.

Special Quotations given for Ironbark Girders, Deck Planking, and all Special Orders supplied direct from Bush Mills.

Joist Timber, 2in. to 4in. thick to 12in. wide to 21-ft. long (providing time is given to obtain from bush mill), 38/6.

MACHINE DRESSING AND TURNING HARDWOOD BEAMS.

	s.	d.
Dressing Heavy H.W. Storey Posts.		
Not less than 10ft., 12in. x 12in. or over, per cubic foot ...	1	3
Dressing under 1in. x 12in., per foot run	1	3
Turning H.W. Storey Posts. For Stores, Warehouses, &c.		
Posts 10ft. long and over, size 12in. x 12in. or over, per cub. ft.	2	6
Ditto, under 12 x 12...	3	0

Turned Telephone or Telegraph Poles.
(Tapered 30ft. 10in. to 6in., 40 feet long.)
Bottom, 10ft. dressed 10in. octagon, from £5 each.
For special quotations, *see advt., page* 21.

Machine Dressing, general mill price. Pine, per 100 super 10 0

JOISTS AND RAFTERS, FLOORS AND ROOFS.

Labor per square of 100-super feet.

Naked Framed Floors, including nails.

Wages, 2/6 per hour.

Spaced 18in.	Material used Inches.	Labor and Nails Net. s.	d.
H.W. Ground joists and plates, bedded, level, not framed	5 x 2½	6	6
Ditto and 1st floor, notched on to plates and girders	6 x 2½	8	0
Ditto, framed to chimneys and well-holes ...	6 x 3	10	0
Ditto, common ceiling joists, notched on to plates	4 x 2½	6	0
Spaced 18in. Oregon floor joists, 9 x 3 and 12 x 3	10/– to 12	0	
H.W. Intermediate Trimmers to well-holes, &c.	...	15	0
Pine herring-bone strutting, per foot run ...	2 x 2	1	0
Labor, laying **Flooring boards,** per square, from ...	6/– to 11	0	
Ditto, secret nailed, according to width of board	10/– to 12	0	

ROOFS.

Labor, per square.

Spaced 18in. common shed or lean-to roof, for slates or tiles	4 x 2	6	0
3-feet ditto, ditto, for galv. iron	4 x 2½	3	6
Two-storey gable roof, cut to ridge, pole or wall-plates	4 x 2½	8	0
Ditto, if bevels cut at mills, reckon fixing only ...		4	6
Ditto, hips and valleys		11	0
Ditto, levelling, cutting in pole plates, 2in. x 2in. H.W., per foot run		0	6
For more than 2-storey, add for hauling material and scaffolding, per square		2	0

ONE DAY'S WORK FOR 2 CARPENTERS.

Labor of 2 men. Marking out and **cutting** 20 squares, 4 hip roofing, cottage, 1 day.

" Striking " or fixing 4 x 2 rafters, 7 x 1 hips and ridges of roofing, 1 day.

Staying with 4 x 3 purlins and 3 x 2 struts and collarties, 1 day.

9in. Fascias 2ft. soffit on bracketting, fit same around, 1 day.

Filling in hip and valley and chimney boards, or gable studs, and minor necessary work. 1 day.

5 days' work for Cottage Roof at 22/– per day each = £11 net.

Add for profit, waste, materials, nails and incidentals.

WEATHER BOARDS TO COVER 100 Sq. Ft.

200 ft. run 7in., 170 ft. run 8in., 150 ft. run, 9in., 134 ft. run 10in.

Allow 1 lb. of 2in. 10 gauge nails for 300ft. run of 6in. weatherboard. and ½ lb. of 1½in. 12 gauge for 100 ft. super of 6in. lining board.

BRIDGE OR WHARF PLANKING.

The brush box is the most suitable kind. Also makes excellent flooring when seasoned. Said to resist the white ants, 38/– per 100.

ROOF—CONSTANTS FOR ASCERTAINING THE LENGTH OF RAFTERS AND HIPS.

The Half-Span being Unity, or 1.

	Slope	Angle of Rafter	Angle of Hip	Length of Rafter	Length of Hip	Height of Roof
		deg. min.	deg. min.			
Rise $\frac{1}{8}$ span ...	4 to 1	14.	10.2	1.031	1.437	.250
„ $\frac{1}{6}$ „ ...	3 to 1	18.26	13.15	1.054	1.452	.333
„ $\frac{1}{5}$ „ ...	$2\frac{1}{2}$ to 1	21.49	15.47	1.077	1.469	.400
„ 4 „ ...	2 to 1	26.34	19.27	1.118	1.500	.500
„ $\frac{1}{3}$ „ ...	$1\frac{1}{2}$ to 1	33.42	25.14	1.202	1.563	.667
Square roof ...	1 to 1	45.	35.16	1.414	1.732	1.000
Rise $\frac{2}{3}$ span ...	$\frac{3}{4}$ to 1	53.8	43.19	1.667	1.943	1.333
„ $\frac{3}{4}$ „ ...	$\frac{2}{3}$ to 1	56.19	46.41	1.803	2.062	1.500
Gothic roof ...		60.	50.56	2.000	2.236	1.732
Rise = span ...	$\frac{1}{2}$ to 1	63.27	54.44	2.237	2.449	2.000

Roofs.—To obtain the length of the rafter and hip of a square roof, with a pitch of 1 to 1, from the above table. Assuming the half span to be 13ft., then the rafter will be = 1.414 x 13 = 18.38, or 18ft. 4⅝ins., the hip rafter being 1.732 x 13 = 22.52 = 22ft. 6¼in.

ROOFING.—LABOUR AND NAILS AT 2/9 PER HOUR. CUTTING, BORING & FIXING OREGON.

	per 100 sup. ft. s.	d.
Single span or valley roof over ground floor	20	0
Ditto, for every extra floor, add	1	6
Girders, binders, struts, angle ties, and curb roofing, with pole plates, and rafters	18	0
King truss roof, with purlins, &c.	30	0
Queen truss roof, from 30 to 45 feet span, with purlins, &c., over ground floor	35	0
Framed roofing, from 45 to 60 feet span, with principals, king and queen posts, struts and purlins, over ground floors ...	38	0

Ditto, if higher, add for raising, extra, from 20%.

Ironwork, king bolts, stirrups, straps, &c., per lb., fixed, –/9.

Laminated semi-circular roof trusses, wrought all sides, painted before being put together, and nailed in thicknesses is worth from 50 to 70 per cent. more than for similar solid framing.

Equilateral Gothic Oregon roof truss, 43 feet span, principals 12 x 6; tie beams 10 x 5, with hammer beams, wrought below collar ties, stop chamfered and fitted; cost price per truss, about £10.

Raising the above with four men, derrick, &c., 30/–. 4 Trusses, £6.

If of H.W. timber, add 25 to 30 per cent. on the roof items for labor.

FLOOR LAYERS.

Labour only, per square of 10ft. x 10ft. Award Aug., 1923.

T. & G. Boards	Warehouses, Stores and Factories Punched, cleaned off. H.W.	S. woods.	Halls, Schools, Churches. H.W.	S. woods
	s. d.	s. d.	s. d.	s. d.
6 x 1	5 3	4 4	5 4	4 5
6 x 1¼	5 7	4 6½	5 7	4 8
5 x 1 or 1¼ } 5½ x 1 or 1¼ }	5 7	4 6½	6 0	4 10
4 x 1	6 1	4 6½	6 7	4 11
4 x 1¼	6 7	4 11	6 10	5 4
4 x 1½	6 8	5 4	7 4	5 10
3½ x 1 or 1¼	6 8	5 10	7 5	6 1
3 x 1 or 1¼	7 4	6 2	8 1	6 7
2½ x 1 or 1¼	8 1	6 11	8 6	7 4
2 x 1 or 1¼	8 10	7 4	9 3	7 8

Extra for secret nailing, rate 1½d. on above. Only cutting down, 1/9½. Laying malthoid on open joints, 1/5. Ditto on concrete, 1/–.

Houses, Banks, Flats, and Offices.

	H.W.	S. wood		H.W.	S. woods.
	s. d.	s. d.		s. d.	s. d.
6 x 1	5 5	4 6½	4 x 1½	8 1	6 4
6 x 1¼	5 10	4 10	3½ x 1 ... —	8 1	6 4
5 x 1	6 4	5 1½	3 x 1	8 6	6 10
4 x 1	6 10	5 8½	2½ x 1	8 10	7 8
4 x 1¼ ...	7 4	6 1	2 x 1	9 6	8 7

T. and G. FLOORING AND LINING.

NUMBER OF BOARDS OF DIFFERENT FACE WIDTHS TO COVER 100 SQUARE FEET.

and Number of Nails necessary per Square for Joists 18 inches apart.

A 7-lb. packet 1¾in. x 11 Gauge = 1225 nails or 175 to the lb., and will nail about 4 squares 2 nails to each joist crossing.

280 nails per square = 20 boards 10ft. 6in. wide = 200 ft. run.
308 nails per square = 22 boards 10ft. 5½in. wide = 220 ft. run.
420 nails per square = 30 boards 10ft. 4in. wide = 300 ft. run.
480 nails per square = 34½ boards 10ft. 3½in. wide = 345 ft. run.
560 nails per square = 40 boards 10ft. 3in. wide = 400 ft. run.
680 nails per square = 48 boards 10ft. 2½in. wide = 480 ft. run.

APPROX. NUMBER OF NAILS TO THE POUND.

Size.	Nails per lb.	Size.	Nails per lb.	Size	Nails per lb.
in.		in.		in.	
1 x 16G	1080	2 x 11G	158	3 x 9G	67
1 x 15G	840	2 x 10G	120	3 x 8G	60
1 x 14G	723	2 x 9G	100	3 x 7G	48
1½ x 14G	460	2¼ x 13G	200	3 x 6G	39
1½ x 13G	340	2¼ x 12G	150	3½ x 8G	44
1½ s 12G	240	2½ x 11G	130	3½ x 7G	40
1½ x 11G	206	2½ x 10G	100	4 x 7G	35
2 x 14G	280	2½ x 9G	80	4 x 6G	30
2 x 13G	230	2½ x 8G	65	5 x 5G	21
2 x 12G	190	3 x 10G	81	6 x 4G	13

LABOR TO PINE IN SCANTLINGS.

	Per 100 s. ft. s. d.
Beams, breast-summers, wall-plates, pole-plates, lintels, templates, sleepers, &c.	10 0
Framing rough ordinary scantlings	15 0
Ditto, wrought by hand	20 0
Joists, ground, ceiling-floor, or ceiling joists, notched or housed and spiked	8/- to 10 0
Ditto, framed to binding joists, girders, &c.	12 0
Ditto, single-framed floors, trimmed to well holes, chimneys, &c.	13 0
Add for each storey above ground floor	1 0
Partitions, 3in. x 2in., framed	14 0
Ditto, 4 or 5 x 3	12 0
If braced, add for each side	1 0
Ditto, trussed with king posts, add	4 0
Ditto, with king and queen, add	5 0

N.B.—If in hardwood add from 10 to 20 per cent.

CENTERING.

Cost of Framework for Concrete Plain.

	Per sq. yard. s. d.
Simple slab floors supported on R.S.J.	3 6
Enclosure for covered beams and piers	4/6 to 6 0
Plain walls timbered both sides	3/6 to 5 0
For special intersections of columns, reckon extra according to design and moulding shapes, twice to five times.	
Running moulds, large and plain, 6in. wide, per running yd.	2 6
Ditto, 12in. wide	4 0
Add nett fixing to the cost of redwood mould (from monthly timber price lists) from -/3 per foot run.	

CENTERING.

	Per super. ft. s. d.
Centering for gauged arches, or culverts	1 0
Ditto, small groined arches	1 10
Common centering on 3in. ribs, with inch battens for vaults and large culverts	0 10
Heavy centering, for arches, 15 to 30 feet span	1 5
Centering for concentric segmental (circular circular) arches of concrete, 16 to 20 feet span, springing from circular iron girders on piers for covered reservoirs, &c., the centering being formed on trussed ribs (radiating in plan) from 3 to 5 feet apart, and covered with colonial pine laggings, 1½in. x 1½in.	1 9

If the same centre is used more than once, the setting and striking should be reckoned and one-half the cost of the centre.

Forming Moulds for Concrete Beams 2 feet high 12in. wide x 10ft. long.

	s. d.
Timber 5 x 10ft. = 50ft. oregon dressed 6in x 1in., at 37/-	18 6
35ft. stirrup pieces 2 ft. apart, 2 x 1 oregon, at 6/- per 100ft.	2 6
40ft. run supporting props, struts, &c., 4 x 3 at 25/- per 100	10 0
	31 0
Labor, Net	9 0
Moulds for 10ft. beam, Net total	40 0
Or per foot run of beam	4 0

Framed Boarding for Concrete Wall. Each side per square Wired and Stayed apart.

	Per 100 super ft. s. d.
8/10ft. 4 x 2 oregon uprights, 2 ft. apart = 80ft. at 25/- ...	20 0
6 x 1 T. & G. flooring, white pine = 100 super ft. at 38/- ...	40 0
Labor, per square to above, and nails, 1/-	8 0
	68 0

Both sides at 68/- each = 136/- or 12/3 per sq. yd.

Add for fixing, bolting or wiring, and staying, 2/3 per sq. yd. = 14/6 per sq. yd. for the first placing in position.

By cutting wires and releasing boarding, the cost is reduced by re-using. The setting and striking only reckoned on primary cost, plus 10 per cent. for waste.

EXAMPLES IN ESTIMATING COTTAGE FLOORING AND JOISTING.
Per Square, 10ft. x 10ft.

Example No. 1.

	p. lin. ft.	£	s.	d.
H.W. Plate, 3 x 1, — 2/10 — 20ft. run ...	6/—	0	1	4
Centre Bearer, 4 x 3, 1/10 — 10ft. run ...	30/—	0	3	0
H.W. Joists, 4 x 2, 7/10 — 70ft. run ...	25/—	1	9	9
Flooring, 4 x 1, T. & G. Oregon — 110ft. run	52/—	2	7	3
Labor, laying joists, bedding plates and nails	4/6	0	7	8
Labor, laying flooring...		0	6	0
Add for profit, &c.	Net cost	£4	15	0

FLOORING AND JOISTING, per square.

Example No 2.

	per 100 run	£	s.	d.
H.W. Plates, 3 x 2, 2/10 — 20ft. run ...	15/—	0	3	0
Centre Bearer, 5 x 3, 1/10 — 10ft. run ...	34/—	0	3	5
H.W. Joists, 6 x 2, 7/10 — 70ft. run ...	39/—	0	19	0
Floorboards, 4 x 1, T. & G. Col., plus 10% waste	60/—	3	6	0
Labour, Joists, –/8, Flooring, 8/–, Nails, 1/–		0	17	0
Add profit, &c.	Net	£5	18	0

FIRST FLOOR.

Example No. 3. 110 sup.

	£	s.	d.
Oregon Joisting, built in 9in x 2in. — 7/11 — 116 s. ft., 26/6	1	10	0
Floor Boards, 4 x 1, T. & G. Oregon, plus 10 per cent. waste — 110 sq. ft. at 60/–	3	6	0
Labor, joists, plates, per square	0	8	0
Labor, laying floor, per square, 4/–, Nails, 2/–	0	6	0
Net	£6	0	0

FLAT ROOFS.

Example No. 4.

	£	s.	d.
7 10fts. 5 x 2, H.W. Joists — 70, at 30/– per 100 run ...	1	1	0
4 x 1, T. & G. flooring Rimu, at 46/– per 100 run ...	2	6	0
Laying Joists to slope	0	10	0
Laying Floor Boards	0	8	0
Vulcanite and laying, not 2 ply, to 4/– per yd.	2	5	0
Add profit, waste, haulage, &c. Net	£6	10	0

EXAMPLES FENCING, VARIOUS, per foot run.
Labor, 22/- per day of 8 hours.

No. 1 *Example*—	£	s.	d.
40 feet H.W. 4ft. Front Cottage Fence.			
Mahogany Pickets, D. and C., 4in. x ⅞in..			
90 of 4ft. = 360 l. ft. at 17/6 per 100 run	3	3	0
7 posts 7ft. x 5in. x 3in. = 53 s. ft. at 44/-	1	3	6
75ft. dressed rails 3 x 2 at 44/- per 100 ft. run	1	13	0
Fancy Gate, 38/-, hinges and catch, 3/6	2	1	6
Net cost material	£8	1	0
Labour, at 2/- per foot	4	0	0
Painting, nails and posts, oiling packets, 2/-	4	0	0
Profit and incidentals	4	19	0
	£21	0	0

Net cost, 8/- per foot run.
40ft. of above fence and gate cost about £21 complete.

Dressed Picket Fence.

No. 2 *Example*—40ft. cottage 5ft. fence and gate	s.	d.
Cut plain 5 posts 7ft. x 4 x 4 H.W. = 47 s. ft. at 30/- per 100	20	0
2 rails, 80ft. run of 4in. x 2in. H.W., 38/- super	18	6
97 pickets 5ft. spaced 5in. (in-to-out). *See Spacing table*= 490ft. run at 17/6	86	0
	124	6
Labor to 40ft. at 2/-	80	0
Pointing both sides, 2/- per ft. run	80	0
	284	6

Total net = £14/5/-, or net 7/- per foot run.
Add for profit and incidentals.

No. 3 *Example*—

	s.	d.
2ft. 6in. **Close d.d. and beaded Mahogany W.B.**, two 4 x 4 arris rails	8	8
2ft. of stone work, 9in. wide, dressed top at 2/6 per cubic ft.	4	4
Net per foot run	13	0

Add for 3ft. wide plain gates, hanging complete, from £2 to £3 each.

No. 4 *Example*—

5ft. 6in. **3-rail Capped Fence**, D. & C. Mahogany Pickets, on H.W. 5 x 2 sill, 5 x 3 posts, including gate to match, painted	16	0
Plain Rubble Walls, under 9in. x 12in. deep, per ft. run...	2	6
Per foot run	18	6

ESTIMATE SAWN HARDWOOD FENCING—6ft. Close Paling. per rod of 16ft. 6in.

	s.	d.
No. 5 *Example*—		
2 rails, 16ft. 3in. x 2in. = 32ft., at 38/– per 100... ...	12	8
2 posts, 9ft. 6in. x 2½in. = 20ft., at 34/– per 100 ...	6	10
45 palings, 6ft., at 36/– per 100 (4½in. wide x ½in. space) ... (See Table of Spacing.)	16	6
Nails, 6d. ; and iron hoops, 2 rows	3	0
Labor, per rod ... ...7/– to 8	6	
Net	47	6
Per foot run, about	3	0

Information pages, *advt.* 21, 30, 33, 35, 59.

Split Posts, 7ft. long, 3/– each.

ESTIMATE OF H.W. WEATHERBOARD FENCING.

Per rod of 16 feet 6in.	s.	d.
2 posts 9ft. x 6in. x 2in. = 18 s. ft.		
2 rails 16ft. 6in. x 4 x 2 = 24 s. ft. } 52 s.f. at 33/ ...	17	0
Struts and sills, every other post = 10 s.f.		
33 dressed Weatherboards, 6ft. x 7in. x 1in. = 198ft. run, at 21/–	42	0
Add for waste and incidentals	10	0
Labor and nails, per rod	16	0
Equals about 5/6 per foot run = net	85	0
If painted, add 3 coats painting, 33ft. x 6ft. (both sides).		
198 s. ft. = 22 sq. yds. at 2/9 per sq. yd. ... ... (*See Painter.*)	60	0
Total net	145	0

Cost, painted complete, 9/– per foot run, net.

If rounded tops, 33 at 2d. each board = extra on rod ... 5 6

6ft. GAL. COR. IRON FENCE.

Similar scantling to last Example.

	per rod s.	d.
Timber only, as above	17	0
Labor to fence woodwork	8	6
Eight and a half sheets, 6 gal. iron, at 3/3	27	6
Labor to gal. iron, about 100 s. ft.	6	6
Nails, screws and washers	2	6
	62	0
If timber only painted, add	14	0
Net cost	76	0
Add for profit, incidentals and waste, 25 per cent. ...	20	0
	96	0

About 6/– per foot run. Contract price from 7/– per foot run.

HEAVY H.W. STEPS—DRESSED AND FIXED.

	£	s.	d.
Flight of 38 treads, 12in. x 3in., nosed steps, 4ft. wide, 30ft. close strings, 12in. x 3, housed and bolted—6/–.			
Labor only—2 carpenters 52 hours = 1 man 104 hours at 2/9	14	6	0
150 super feet Hardwood, at 40/– per 100 s.f.	3	0	0
Bolts	0	6	0
= about 9/6 per step			
	17	12	0

COTTAGE, H.W. STEPS.

	£	s.	d.
Flight of 14 treads, 12in. x 12in., nosed steps, 4ft. wide, close strings, 12in. x 2in. H.W. ; dressed ; material, 160 s. ft. at 40/– per 100	3	4	0
Labor, 26 hrs. at 2/9, and nails 2/6	3	14	0
Net cost	6	18	0
At 14 treads about = 10/– per step.			

LATTICE.

Rough Lattice Fencing, 3ft. high, with continuous laths, 1½ x ¼ laths, on 3 x 1 H.W. battens top and bottom, in 8ft. spans, 3ft. high, unpainted, per foot run 3 0

CARPENTRY.

Plugging Walls.

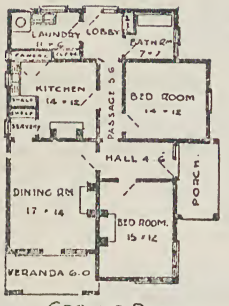
Labor only, at 3/– per hour, average tradesman, cottage work. Raking out lime mortar joints in new building, making and fixing plugs for 7in. skirting, 3in. picture rail, 5in. architraves, ordinary room, 48ft. run around walls, one window 5ft. x 3ft. and two doors = 110ft. run of plugging area.

	per foot of skirting length of room per ft.
Plugging new work, one man, 3 hours, = 9/– 12/– plugs added	1½
Ditto, old plastered walls, one man, 5 hours = 15/– ... ... 18/– „ „	2¼
Ditto, cemented walls and joints, one man, 8 hours = 24/– ... ... 27/– „ „	3⅜

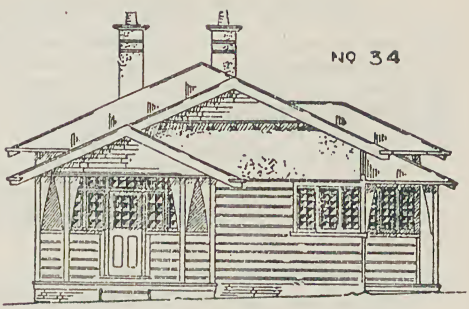
Add cost about 100 plugs for each room = pine, 2/3 ; cedar, 3/–.
which works out per running foot plugging 100 feet per room –/3.

Labor only—

Fixing 7in. skirting, 50ft., 4 hours = 12/– about –/3 per ft run.
Fixing 3in. picture rail, 50 ft., 2¾ hours = 8/3, about –/2 per ft. run
Fixing 4in. architraves, 17 ft. per set, 1½ hours. = 4/6, about –/3d. per ft. run.
Add cost of plugging above.



GROUND PLAN.



FRONT ELEVATION.

VARIOUS WEATHERBOARD WALLS.

Covering only net cost, per square.

	Material per 100.	Labor per square.	Net.
Weatherboards, Baltic, 7in. chamfered	24/–	6/6	30/6
Weatherboard Hardwood, 7in. dressed, splayed	34/–	8/6	42/6
Weatherboard, Cypress Rustic ...	42/–	7/–	49/–
Mahogany Rustic, dressed, 9 x 1 ...	58/–	9/3	65/6
Oregon, Rustic, 9 x 1	45/–	7/6	52/6
Redwood, Rustic, 9 x 1	60/–	7/–	67/–

Add for studding incidentals, profit, &c., to above.

Value of Labour Required

For erecting Ready Prepared W B. Cottages as advertised

Three Rooms and Kitchen, from £56.

For W.B. Buildings, ready for erection, see *advt.*, *pp.* 26, 30, 35, 40.

Taken from August, 1926, Price List.

Timber, Best 1st Class, standard 12 inches, 1 inch thick, per 1— ft. sup.

White pine, 60/–. Rimu, 57/–. Kauri, 75/–. Beech, 100/– Dorrigo, 60/–. Pacific Maple, 60/–. Blackwood, 77/–. American Yellow Pine, 65/–. Redwood, 66/–. Lamao Maple, 67/–. Maryborough Pine, 69/–.

Per square foot.

Putts Pine, 10½d. Queensland Maple, 1/4. Pacific Oak, 9½d. Cedar, 1/4. Tasmanian Oak, 7d. Silky Oak, 11d. Best Hardwoods, 40/–. Tallowwood, 46/–. Oregon, 45/–.

GANTRIES (Labor only).

	Per 100 s. ft. s. d.
Framework for steam building whips, light timbers ...	30 0
Gantry for travelling crane, braced, and bolted together, not more than 40 ft. high (Oregon) heavy timbers ...	20 0
Add for every 10ft. extra height	0 8

Travelling crane (Oregon) trussed with iron tie rods, bars, &c., about double these prices, including hoisting.

Labor in fixing and hoisting, ironwork, including wheels and axles to ditto, per lb., 3d.

The bolts, dog-irons, &c., will not exceed 8lb. per 100 super feet.

TRIPOD GANTRY TOWERS FOR STATIONARY STEAM DERRICK CRANE.

Materials.

For a 50 Feet Tower to lift 5 to 10 tons.

6ft. x 6ft. done braced and bolted legs, in 10ft. bays, and 50ft. span.

	Lin. ft.	Inches.	sup. ft.
Corner posts, 12 of 50ft. each, 9 x 7 x 2	600	16 x 2	1550
Corner rails, 72 of 6ft.	432	7 x 3	750
Diag. braces, 20 of 15ft.	1800	6 x 2	1800
Sleepers and plates, 12 of 8ft. ...	96	9 x 4	288
Side ties joining legs, 9 of 50ft. ...	450	9 x 3	1012
Side braces, 12 of 80ft....	960	7 x 3	1680
Fish plates, 80 of 6ft.	480	7 x 3	840
Top plates, 3 of 60	180	10 x 4	600
			85.20
10 per cent. waste			855
			93.72
Material, 93·75 s. ft. at 32/–			£150
Labor to above, per 100 super feet, at 20/–			102
			£252

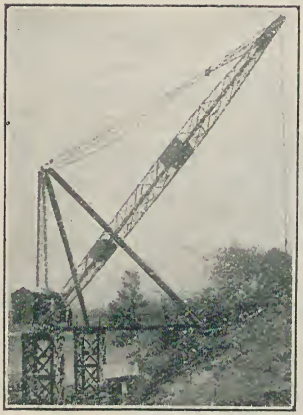
For every 10 feet higher, add one-fifth for extra materials and labor in hauling.

Top platform to be added—**Bolts and Iron Straps** for 50 feet, about 70cwt.

In erecting tall buildings the reinforced concrete floors (**built by the aid of tower hoist**) or girder framing of R.S. Joists are used to support cantilevers. Bracket platforms projecting 8 to 10 feet outside building, every 3 or 4 storeys to support light working crane for handling building materials.

Where ground space is **confined or small**, a working platform extending over footpath, or heavy H.W. 9 x 3 cantilever bearers covered with 3in. or 2in. planks, at first floor level.

Also the clever placing of hopper depots and chutes for receiving and distributing building materials is a necessary expense.



Electric 3-ton Derrick Cranes.

70 feet Steel Jibs

£790.

See advt., p. 9.

100 FEET OREGON TOWER FOR CONCRETE PLACING.

Equipment and Chutes Support.

Example, estimating **single braced** light timber **tower,** 100ft. 8ft. x 8ft.

	s. ft.
4 **Corner Standards** 100ft. 8in. x 2in. and 6in. x 2in. (forming single post 8in. x 8in.) — 400 l. ft. 14in. x 2in.... ...	933
12 **bearers** 8ft x 6in. x 2in., 8ft. apart	385
12 single braces 11ft. x 4in. x 2in. each side — 528 l. ft. ...	352
2 runners 3in. x 2in. for guids to elevating or moving platform	100
	1770
If double braced, add 352 s. ft. plus 96 bolts $4\frac{1}{4}$in. x $\frac{3}{8}$in., add waste	30
	1800

192 bearer and brace bolts, square heads, $4\frac{1}{2}$ x $\frac{5}{8}$ } = 1981lbs.
48 standard bolts and nuts }

Labor, cutting bearers, braces, bolting together ready to erect

	£	s.	d.
1 man 80 hours 10 days			
4 men erecting and fixing plumb 2 days — 8 days			
18 days at 20/-	18	0	0
2 sets of wire rops guys — 1020 feet long, 36 lbs. per 100 feet — at £7 per cwt ... ... Fxing, etc.	12	0	0
1800 s. ft. of oregon ... ... at 30/-	27	0	0
198 lbs. bolts ... ... at -/9 lb.	7	8	0
Net	£64	8	0

Add for incidentals, cartage, striking and profit

IMPORTANT.

A concrete flume distributing mast must be 30 feet higher than top receiver hopper position for freedom in working.

Raising and fixing 7-ton steam derrick crane on to 50ft. derrick in position **Labor** from £30.,

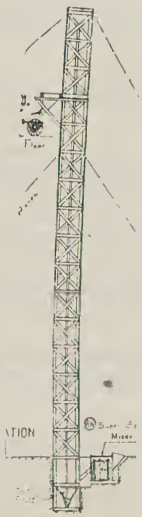
Price of Crane.—See Electrical.

Weighing material, use of small accessory crane for raising and striking to be added.

EXAMPLE.—BRACED TIMBER TOWER.

50ft. x 10ft. x 10ft.
FOR CONCRETE FLUME DISTRIBUTOR.

	Oregon su. ft.
4 Corner Standards, 9in. x 2in. and 7in. x 2in., forming single post 9in. x 9in.	534
32 bearers, averaging 10ft. 6in. x 2in., 8 bearers each side 6ft apart	320
56 single braces, 12ft. 4 x 2—14 each side	440
	1550



	£	s.	d.
1550, reckoning oregon 30/–, labor fitting at 20/– per 100	15	10	0
120 bolts $4\frac{1}{2}$ x $\frac{5}{8}$, square heads = 84 lbs. 20 bolts 10 x $\frac{1}{2}$ = 14lbs = 98lbs. at –/9	3	15	0
Raising	7	0	0
	£49	0	0

ANGLE IRON DERRICK.

	bs.l
3in. angle iron, 50ft. x 8ft., braced tower.	
450ft. 4ft. x $\frac{1}{2}$ = 12.7lbs. per foot	5715
600ft. 2in. x 2in. x $\frac{1}{4}$ = 3.16 lbs. per foot	1896
	7611

68cwt. at 20/– per cwt. = £68; in about £2 per foot in height.

Planks for platform, 1 square, 3in. thick = 20 su. ft.

For lighter scantling of angle iron.—See Tablesmith.
See steel Tank Stands, Windmill Standards.
See Artesian Wells for tapered Steel Derricks.
See Windmill Tower Construction, *pp.* 10, 34.

TIMBER MERCHANTS' TABLE OF BOARDS.

To Find the Superficial Contents of **One inch Boards** of different widths.

Boards. Size in inches.	Length of Board in Feet.														
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3 ...	1.3	1.6	1.9	2.0	2.3	2.6	2.9	3.	3.3	3.6	3.9	4.0	4.3	4.6	4.9	5.0
4 ...	1.8	2.0	2.4	2.8	3.0	3.4	3.8	4.	4.4	4.8	5.0	5.4	5.8	6.0	6.4	6.8
5 ...	2.1	2.6	2.11	3.4	3.9	4.2	4.7	5.	5.5	5.10	6.3	6.8	7.1	7.6	7.11	8.4
6 ...	2.6	3.0	3.6	4.0	4.6	5.0	5.6	6.	6.6	7.0	8.6	8.0	8.6	9.0	9.6	10.0
7 ..	2.11	3.6	4.1	4.8	5.3	5.10	6.5	7.	7.7	8.2	8.9	9.4	10.11	10.6	11.1	11.8
8 ...	3.4	4.0	4.8	5.4	6.0	6.8	7.4	8.	8.8	9.4	10.0	10.8	11.4	12.0	12.8	13.4
9 ...	3.9	4.6	5.3	6.0	6.9	7.6	8.3	9.	9.9	10.6	11.3	12.0	12.9	13.6	14.3	15.0
10 ...	4.2	5.0	5.10	6.8	7.6	8.4	9.2	10.	10.10	11.8	12.6	13.4	14.2	15.0	15.10	16.8
11 ...	4.7	5.6	6.5	7.4	8.3	9.2	10.1	11.	11.11	12.10	13.9	14.8	15.7	16.6	17.5	18.4
12 ...	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
13 ...	5.5	6.6	7.7	8.8	9.9	10.10	11.11	13.	14.1	15.2	16.3	17.4	18.5	19.6	20.7	21.8
14 ...	5.10	7.0	8.2	9.4	10.6	11.8	12.10	14.	15.2	16.4	17.6	18.8	19.10	21.0	22.2	23.4
15 ...	6.3	7.6	8.9	10.0	11.3	12.6	13.9	15.	16.3	17.6	18.9	20.0	21.3	22.6	23.9	25.0
16 ...	6.8	8.0	9.4	10.8	12.0	13.4	14.8	16.	17.4	18.8	20.0	21.4	22.8	24.0	25.4	26.8
17 ...	7.1	8.6	9.11	11.4	12.9	14.2	15.7	17.	18.5	19.10	21.3	22.8	24.1	25.6	26.11	28.4
18 ...	7.6	9.0	10.6	12.0	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.0	25.6	27.0	28.6	30.0
19 ...	7.11	9.6	11.1	12.8	14.3	15.10	17.5	19.	20.7	22.2	23.9	25.4	26.11	28.6	30.1	31.8
20 ...	8.4	10.0	11.8	13.4	15.0	16.8	18.4	20.	21.8	23.4	25.0	26.8	28.4	30.0	31.8	33.4
21 ...	8.9	10.6	12.3	14.0	15.9	17.6	19.3	21.	22.9	24.6	26.3	28.0	29.9	31.6	33.3	35.0
22 ...	9.2	11.0	12.10	14.8	16.6	18.4	20.2	22.	23.10	25.8	27.6	29.4	31.2	33.0	34.10	36.8
23 ...	9.7	11.6	13.5	15.4	17.3	19.2	21.1	23.	24.11	26.10	28.9	30.8	32.7	34.6	36.5	38.4
24 ...	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40.0

TABLE CONVERTING SQUARE POSTS AND BEAMS TO SUPERFICAL MEASURE.

Size Scantling.	Length in Feet. 8	9	10	11	12	14	16	18	20	26	100
4 x 4	10.8	12.0	13.4	14.8	16.	18.8	21.4	24.0	26.8	34.8	134.
5 x 5	16.8	18.9	20.10	22.11	25.	29.2	33.4	37.6	41.8	54.2	209.
6 x 6	24.0	27.0	30.0	33.0	36.	42.0	48.0	54.0	60.0	78.0	300.
7 x 7	32.8	36.9	40.10	44.11	49.	57.2	65.4	73.6	81.8	106.2	409.
8 x 8	42.8	45.6	53.4	58.8	64.	74.8	85.4	96.0	106.8	138.8	534.
9 x 9	54.0	60.9	67.6	74.3	81.	94.6	108.0	121.6	135.0	175.6	675.
10 x 10	66.8	75.0	83.4	91.8	100.	116.8	133.4	150.0	166.8	216.8	834.
11 x 11	80.8	90.9	100.10	110.11	121.	141.2	161.4	181.6	201.9	283.9	1009.
12 x 12	96.0	108.0	120.0	132.0	144.	168.0	192.0	216.0	240.0	312.0	1200.
14 x 14	130.8	147.0	163.4	179.8	196.	228.8	261.4	294.0	326.8	424.8	1634.

TABLE CONVERTING FLOOR, ROOF AND STUD SCANTLINGS TO SUPERFICIAL MEASURE.

Size of scant'g.	Length in Feet. 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2 x 1½	1.3	1.6	1.9	2.	2.3	2.6	2.9	3.0	3.3	3.6	3.9	4.	4.3	4.6	4.9	5.0
3 x 1½	1.11	2.3	2.8	3.	3.5	3.9	4.2	4.6	4.11	5.3	5.8	6.	12.5	6.11		7.6
4 x 1½	2.6	3.0	3.6	4.	4.6	5.0	5.6	6.0	6.6	7.0	7.6	8.	8.6	9.0	9.6	10.0
5 x 1½	3.2	3.9	4.5	5.	5.8	6.3	6.11	7.6	8.2	8.9	9.5	10.	10.8	11.3		12.6
6 x 1½	3.9	4.6	5.3	6.	6.9	7.6	8.3	9.0	9.9	10.6	11.3	12.	12.9	13.0	14.3	15.0
7 x 1½	4.5	5.3	6.2	7.	7.11	8.9	9.8	10.6	11.5	12.3	13.2	14.	14.11	15.9	16.8	17.6
8 x 1½	5.0	6.0	7.0	8.	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.	17.0	18.0	19.0	20.0
9 x 1½	5.8	6.9	7.11	9.	10.2	11.3	12.5	13.6	14.8	15.9	16.11	18.	19.2	20.3		22.6
10 x 1½	6.3	7.6	8.9	10.	11.3	12.6	13.9	15.0	16.3	17.6	18.9	20.	21.3	22.6	23.9	25.0
11 x 1½		8.3		11.		13.9		16.6		19.3		22.		24.9		27.6
12 x 1½	7.6	9.0	10.6	12.	13.6	15.0	16.6	18.0	19.6	21.0	22.6	24.	25.6	27.0	28.6	30.0
13 x 1½		9.9		13.		16.3		19.6		22.9		26.		31.6		32.6
14 x 1½	8.9	10.6	12.3	14.	15.9	17.6	19.3	21.0	22.9	24.6	26.3	28.	29.9	31.6	33.3	35 0

N.B.—In the odd sizes and lengths the result is given in *full* inches only.

SCANTLING TO SUPERFICIAL.

Length in Feet.

Size of scant'g.	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	3	32
2 x 2	2.	2.4	2.8	3.0	3.4	3.8	4.	4.4	4.8	5.0	5.4	6.	6.8	7.4	8.	8.8	9.4	1	10.8
3 x 2	3.	3.6	4.0	4.6	5.0	5 6	6.	6.6	7.0	7.6	8.0	9.	10.	11.0	12.	13.0	14.0	15.	16.0
4 x 2	4.	4.8	5.4	6.0	6.8	7.4	8.	8.8	9.4	10.0	10.8	12.	13.4	14.8	16.	17.4	18.8	20.	21.4
5 x 2	5.	5.10	6.8	7.6	8.4	9.2	10.	10.10	11.8	12.6	13.4	15.	16.8	18.4	20.	21.8	23.4	25.	26.8
6 x 2	6.	7.0	8.0	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.0	18.	20.0	22.0	24.	26.0	28.0	30.	32.0
7 x 2	7.	8.2	9.4	10.6	11.8	12.10	14.	15.2	16.4	17.6	18.2	21.	23.4	25.8	28.	30.4	32.8	35.	36.4
8 x 2	8.	9.4	10.8	12.0	13.4	14.8	16.	17.4	18.8	20.0	21.4	24.	26.8	29.4	32.	34.8	37.4	40.	42.8
9 x 2	9.	10.6	12.0	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.0	27.	30.0	33.0	36.	39.0	42.0	45.	48.0
10 x 2	10.	11.8	13.4	15.0	16.8	18.4	20.	21.8	23.4	25.0	26.8	30.	33.4	36.8	40.	43.4	46.8	50.	53.4
11 x 2	11.	12.10	14.8	16.6	17.4	19.2	22.	23.10	25.8	27.6	29.4	33.	34.8	38.4	44.	47.8	51.4	55.	58.8
12 x 2	12.	14.0	16.0	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.0	36.	40.0	44.0	48.	52.0	56.0	60.	64.0

Length of Scantling in Feet.

	6	8	9	10	11	12	13	14	15	16	18	20	22	24	26	28	30	32	34
2 x 2½	2.6	3.4	3.9	4.2	4.7	5.0	5.5	5.10	6.3	6.8	7.6	8.4	9.2	10.0	10.10	11.8	12.6	13.4	14.2
3 x 2½	3.9	5.0	5.8	6.3	6.10	7.6	8.2	8.9	9.5	10.0	11.4	12.6	13.9	15.0	16.4	17.6	18.9	20.0	21.3
4 x 2½	5.0	6.8	7.6	8.4	9.2	10.0	10.10	11.8	12.6	13.4	15.0	16.8	18.4	20.0	21.8	23.4	25.0	26.8	28.4
5 x 2½	6.3	8.4	9.5	10.5	11.6	12.6			15.8	16.8	18.9	20.10	22.11	25.0	27.0		31.3	33.4	
6 x 2½	7.6	10.0	11.4	12.6	13.9	15.0	16.3	17.6	18.9	20.0	22.6	25.0	27.6	30.0	32.6	35.0	37.6	40.0	42.6
7 x 2½	8.9	11.8	13.3	14.7	15.11	17.6			21.11	23.4		29.2		35.0			43.9	46.8	
8 x 2½	10.0	13.4	15.0	16.8	18.4	20.0			25.0	26.8	30.0	33.4	36.8	40.0	43.4		50.0	53.4	56.8
9 x 2½	11.3	15.0		18.9		22.6	24.5		28.2	30.0		37.6		45.0			56.3	60.0	
10 x 2½	12.6	16.8		20.10		25.0			31.3	33.4	37.6	41.8		50.0			62.6	66.8	70.10
12 2½	15.0	20.0	22.6	25.0	27.6	30.0	32.6	35.0	37.6	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0

FLOOR, ROOF AND STUD SCANTLING, REDUCED TO SUPERFICIAL MEASURE.

Size, in.	Length in Feet. 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3 x 3	4.6	5.3	6.	6.9	7.6	8.3	9.	9.9	10.6	11.3	12.	12.9	13.6	14.3	15.	15.9	16.6	17.3	18.
4 x 3	6.0	7.0	8.	9.0	10.0	11.0	12.	13.0	14.0	15.0	16.	17.0	18.0	19.0	20.	21.0	22.0	23.0	24.
5 x 3	7.6	8.9	10.	11.3	12.6	13.9	15.	16.3	17.6	18.9	20.	21.3	22.6	23.9	25.	26.3	27.6	28.9	30.
6 x 3	9.0	10.6	12.	13.6	15.0	16.6	18.	19.6	21.0	22.6	24.	25.6	27.0	28.6	30.	31.6	33.0	34.6	36.
7 x 3	10.6	12.3	14.	15.9	17.6	19.3	21.	22.9	24.6	26.3	28.	29.9	31.6	33.3	35.	36.9	38.6	40.3	42.
8 x 3	12.0	14.0	16.	18.0	20.0	22.0	24.	26.0	28.0	30.0	32.	34.0	36.0	38.0	40.	42.0	44.0	46.0	48.
9 x 3	13.6	15.9	18.	20.3	22.6	24.9	27.	29.3	31.6	33.9	36.	38.3	40.6	42.9	45.	47.3	49.6	51.9	54.
10 x 3	15.0	17.6	20.	22.6	25.0	27.6	30.	32.6	35.0	37.6	40.	42.6	45.0	47.6	50.	52.6	55.0	57.6	60.
11 x 3	16.6	19.3	22.	24.9	27.6	30.3	33.	35.9	38.6	41.3	44.	46.9	49.6	52.3	55.	57.9	60.6	63.3	66.
12 x 3	18.0	21.0	24.	27.0	30.0	33.0	36.	39.0	42.0	35.0	48.	51.0	54.0	57.0	60.	63.0	66.0	69.0	72.

	Length in Feet. 26	28	30	32	36	40	42	45	48	50	55	60	65	70	75	80	100
3 x 3	19.6	21.	22.6	24.	25.6	30.	31.6	33.9	36.	37.6	41.3	45.	48.9	52.6	56.3	60.	75.
4 x 3	26.0	28.	30.0	32.	34.0	40.	42.0	45.0	58.	50.0	55.0	60.	65.0	70.0	75.0	80.	100.
5 x 3	32.6	35.	37.6	40.	42.6	50.	52.6	56.3	60.	62.6	68.9	75.	81.3	87.6	93.9	100.	12.5
6 x 3	39.0	42.	35.0	48.	51.0	60.	63.0	67.6	72.	75.0	82.6	90.	97.6	105.0	112.6	12.0	150.
7 x 3	45.6	49.	52.6	56.	58.6	70.	73.6	78.9	84.	87.6	96.3	105.	113.9	122.6	131.3	140.	175.
8 x 3	52.0	56.	60.0	64.	68.0	80.	84.0	90.0	96.	100.0	110.0	120.	130.0	140.0	150.0	16.0	200.
9 x 3	58.6	63.	67.6	72.	76.6	90.	94.6	101.3	108.	112.6	123.9	135.	146.3	157.6	168.9	180.	225.
10 x 3	65.0	70.	75.0	80.	85.0	100.	105.0	112.6	120.	125.0	137.6	150.	162.6	175.0	187.5	200.	250.
11 x 3	71.6	77.	82.6	88.	93.6	110.	115.6	123.9	132.	137.6	151.3	165.	178.9	192.6	206.3	220.	205.
12 x 3	78.0	84.	90.0	96.	102.0	120.	126.0	135.0	144.	150.0	165.0	180.	195.0	210.0	225.0	240.	300.

SPACING TABLE.

Showing the **nearest number** of Hooks, Spikes, Laths, Dental Blocks, Pickets, Battens, Palings, &c., required when spaced in a **given length** (starting and finishing with **one**).

(Note.—If not starting with **one**, deduct it on Table.)

Given length in feet	Spacing in Inches. 3	4	5	6	7	8	9	10	11	12	13	14	15
5	21	16	13	11	9	9	8	7	6	6	6	5	5
6	25	19	15	13	11	10	9	8	7	7	7	6	6
7	29	22	17	15	13	12	10	9	8	8	8	7	7
8	33	25	20	17	15	13	11	10	9	9	9	8	7
9	37	28	23	19	17	15	13	12	11	10	9	8	8
10	41	31	25	21	18	16	14	13	12	11	10	9	9
11	45	34	29	23	20	18	15	14	13	12	11	10	10
12	49	37	30	25	22	19	17	16	14	13	12	11	11
13	53	40	32	27	23	21	18	17	16	14	13	12	12
14	57	43	34	29	25	22	20	18	17	15	14	13	13
15	61	46	37	31	27	24	21	19	18	16	15	14	14
18	73	55	44	37	32	28	25	23	20	18	17	16	15
20	85	61	49	41	35	31	28	25	23	21	19	18	17
25	101	76	61	51	44	39	34	31	29	26	24	22	21
30	121	91	73	61	52	46	41	37	34	31	29	27	25
35	141	106	85	71	61	54	48	43	39	36	33	31	29
40	161	121	97	81	69	61	55	49	45	41	37	35	33
45	181	136	109	91	78	69	61	55	50	46	41	39	37
50	201	151	121	101	87	76	68	61	56	51	47	44	41
60	241	181	145	121	103	91	81	73	66	62	56	52	49
70	281	211	169	141	121	106	93	85	77	71	65	61	57
80	321	241	193	161	138	121	107	97	88	81	74	69	65
90	361	271	217	181	155	136	121	109	99	91	84	78	72
100	401	301	241	201	172	151	134	121	111	101	93	86	81

N.B.—If not starting with one deduct it on table.

The above is a simple division table to save contractor's time.

Example of how to use Spacing Table :—To find number of hooks or pickets, 5 inches apart, in 50 feet (starting and finishing with one) — 121 —number required. Number of studs or joists, 17 inches apart in 25 feet (starting and finishing with one) — 19—number required.

SPACING TABLE.—Useful for finding the **nearest Number** of Pickets, Battens, Studs, Joists, Projections, Sleepers, Posts, &c., in a given length, over 15 inches apart :—

Lin. feet run.	Spacing in Inches. 15	16	17	18	20	24	30	36	42	48	60	72
5	5	4	4	4	4	3	3	3	3	3	2	2
6	6	5	5	5	5	4	4	3	3	3	3	3
7	7	7	6	6	6	5	4	4	3	3	3	3
8	7	7	7	7	6	5	5	4	4	3	3	3
9	8	8	8	7	7	6	5	4	4	4	3	3
10	9	9	9	8	7	6	5	5	4	4	3	3
11	10	10	9	9	8	7	6	5	5	4	4	3
12	11	10	9	9	9	7	6	5	5	4	4	4
13	12	11	10	10	9	8	7	6	5	5	4	4
14	13	12	11	11	10	8	7	6	5	5	4	4
15	14	13	12	11	10	9	7	6	6	5	4	4
18	15	15	14	13	12	10	9	7	7	6	5	4
20	17	16	15	15	13	11	9	8	7	6	5	6
25	21	20	19	18	16	14	11	10	9	8	6	5
30	25	24	22	21	19	16	13	11	10	9	7	6
35	29	28	27	25	22	19	15	13	11	10	8	7
40	33	31	30	28	25	21	17	15	13	11	9	8
45	37	35	33	31	28	24	19	16	14	13	10	9
50	41	38	37	35	31	26	21	18	16	14	11	10

If not starting with one, deduct it upon Table.

For Spacing Table up to 1 mile, for fencing posts, or droppers, &c. (*See* WIRE WORKER).

PARQUET FLOORING.

Block inch floors laid in designs with borders on existing wood floors, or on concrete surfaces.

These super floors are in polished hardwoods, viz., oak, blackwood, walnut, maple, cherry, &c., sides T.G. and end matched, secretly nailed, surfaced and polished.

Concrete floors covered and fixed in a composition on deadening felt, finished complete, 25/– to 35/– per s. yd.

Oak Parquetry.

In sheets of 2 s. yards each, at from 12/6 per square yd.

Labor, gluing and nailing with brass sprigs to floor, cleaning off, &c. ... ... 3/– to 5/–

Inlaid Woodwork Co. Ltd., Newtown, Sydney.

Monthly price lists can be obtained from timber and joinery mills as prices fluctuate. See advt., pp. 3, 21, 30, 33, 35, 40.

JOINER.

Measurement.—In all superficial work such as floors, panelled ceilings, framed partitions, walls, &c., for "Labor and Nails," or "Labor only," take the full dimensions, including chimney breasts, doorways, windows and all spaces not covered, &c., which are not to be deducted, except the opening exceeds 36 superficial feet, when one-half the area only is allowed.

King and queen posts should be taken full size without deductions for waste in cubing or squaring.

See The Rules for Measurement mentioned in Carpentry.

THE COST OF LABOR TO JOINERY—comparative.

Taking **deal** or **clear pine** as a standard—

"**Joinery**" Oregon, fine grain, picked, 10 per cent. more than clear pine.

Oregon (stock) and cyprus pine, 15 per cent. more.

Cedar, Huon Pine, &c., is about 25 per cent.

Tasmanian Blackwood, Queensland Maple, is 35 per cent. more than clear pine.

Oak, American Walnut, Teak, Japanese Oak, 35 to 50 per cent.

Jarrah, Aus. Hardwoods, and Ironbark, from 50 per cent. to 75 per cent.

A GOOD DAY'S WORK FOR A GOOD TRADESMAN.

Set and bed 10 to 12 box frames, ordinary.
Fit and hang 7 to 10 window sashes.
Fit and hang 6 to 9 doors.
Fit, hang, and lock 4 to 6 doors.
Set door jambs, 4 to 6 sets.
Fit and hang double slide doors, or fix track for one pair.
Fit and hang single slide doors, 2 pairs.
200 to 300 lin. feet plaster grounds.
100ft. good and 150ft. ordinary picture mould, including plugging walls.
50ft. art shelf 4 x 4 and brackets, not including plugging walls.

DOOR AND CASEMENTS.

Example—Cost of Oregon Door only.

	£	s.	d.
4-panel double, raised moulded door, 7ft. x 3ft. x 1¾in., as joinery work list, 21 sup. ft. at 2/7 ... ... See Machinery Joinery List.	2	15	0

JOINERY.

DOOR FRAMES.

(*Mill Prices from price list* 1926.)

	Hardwood or Oregon.
5 x 3, Rebated	each 24/–
5 x 3, Ditto, with Transom	„ 35/–
For 5 ft. x 8.8 ft., high opening, sq. heads	76/–

FANLIGHTS.

(Oregon or Redwood—Glazed.)

	Thick $1\frac{3}{4}$		Thick $1\frac{3}{4}$
2-8 x 1-2	7/6	3-6 x 1-6	12/–
2-10 x 1-4	8/–	4-0 x 1-6	13/–
3-0 x 1-6	10/–	4-0 x 2-0	16/–

STOCK BOX FRAMES.

Daylight Sizes.		each.	Daylight Sizes.		each.
10 x 8 ...	3-11$\frac{3}{4}$ x 2-4	29/6	12 x 14 ...	5-3$\frac{3}{4}$ x 3-4	39/6
10 x 12 ...	4-7$\frac{3}{4}$ x 2-10	35/–	12 x 16 ...	5-11$\frac{3}{4}$ x 3-4	41/6
10 x 14 ...	5-3$\frac{3}{4}$ x 2-10	36/6	10x14x24	5-3$\frac{3}{4}$ x 2-0	35/6
10 x 16 ...	5-11$\frac{3}{4}$ x 2-10	38/–	Double 16x14x24	5-3$\frac{3}{4}$ x 4-6	70/–

1/– extra for Wide Sills for Weatherboards.

With 1 x 1 Storm Mould, 2/– extra.

With 1$\frac{1}{4}$ x 1$\frac{1}{4}$ Storm Mould and Turning Piece, 4/– extra.

VENETIAN SHUTTERS (Minimum 14ft.).

	s.	d.		s.	d.
1$\frac{1}{2}$ thick per s. foot ...	3	6	1$\frac{1}{2}$ Hanging Styles, per set	4	9
1$\frac{3}{4}$ thick, per s. foot ...	4	0	1$\frac{3}{4}$ Hanging Styles, per set	5	6

1$\frac{1}{2}$in. STOCK SASHES (Glazed).

	12-light	4-light	2-light		Size Overall.
10 x 8	21/–	17/–	—	per pair	3-9$\frac{3}{4}$ x 2-4
10 x 12	23/–	19/6	19/6	„	4-5$\frac{1}{2}$ x 2-10
10 x 14	27/–	22/–	22/–	„	5-1$\frac{1}{2}$ x 2-10
10 x 16	30/–	25/–	25/–	„	5-9$\frac{1}{2}$ x 2-10
12 x 14	31/–	25/6	25/6	„	5-1$\frac{1}{2}$ x 3-4
12 x 16	36/–	29/–	29/–	„	5-9$\frac{1}{2}$ x 3-4
10 x 14 x 24	—	—	18/–	„	5-1$\frac{1}{2}$ x 2-0

MILL PRICES TO ORDER UNFIXED JOINERY.

	per super foot
Window openings, $1\frac{3}{4}$ sashes and box frames, 6ft. x 3ft. ope = 18ft.	4 0
Ditto, above 56 super feet	3 6

Glazing to be added.

Casement Frames and Sashes, 5ft. 6in. x 5ft. 6in. = 30 super. feet, glazed	£7 0 0
Double light or triple light, 6ft x 5ft., unglazed	£5 10 0

Add for architraves, linings, sill nosing, fittings and fixing, labor.

Casement Frames and Sashes.

5ft. 6in. x 3ft. 9in....	per opening £5/5/–
5ft. 6in. x 5ft. 6in.	„ „ £7/–/–

Casement Doors, Diminished Styles—Glazed.

Redwood or Clear Oregon, Double Moulded.

7ft. x 3ft. x $1\frac{1}{2}$in.	... 50/–	7ft. x 3ft. x $1\frac{1}{2}$in.	... 52/6
7ft. x 3ft. 4in. x $1\frac{1}{2}$in.	... 53/–	7ft x 3ft. 4in. x $1\frac{1}{2}$in.	... 56/–
7ft. x 3ft. 6in. x $1\frac{1}{2}$in.	... 56/–	7ft. x 3ft. 6in. x $1\frac{1}{2}$in.	... 59/–
7ft. x 4ft.	––		

Circular Heads, 4/6; Raised Panels, 3/6 per pair extra. $1\frac{3}{4}$ thick, 3/– extra.

DOORS.

Clear Oregon, Square Finish, 3 panels.

See Monthly Price Lists of Mill Joinery for fluctuation of prices.
6ft. 6in. x 2ft. 6in. x $1\frac{1}{2}$in., 24/–; 6ft. 8in. x 2ft. 8in., $1\frac{1}{2}$in., 25/–; 6ft. 10in. x 2 ft. 10in. x $1\frac{3}{4}$in., 32/–; 7ft. x 3ft. x $1\frac{3}{4}$in., 35/–; 7ft. x 3ft. x 2in., 38/–. 4 pan., 1/– extra.

Bolection—Moulded Doors.

	S169		S169
6ft. 8in. x 2ft. 8in. x $1\frac{1}{2}$in.	44/–	6ft. 10in. x 2ft. 10in. x $1\frac{3}{4}$in.	51/–
6ft. 8in. x 2ft, 8in. x $1\frac{3}{4}$	49/–	6ft. 10in. x 2ft. 10in. x $1\frac{1}{2}$in.	46/–
7ft. 0in. x 3ft. 0in x $1\frac{3}{4}$in.	54/–		

Glazing Extra.

Margin Light—Doors.

CLEAR OREGON.

S165.

6ft. 8in. x 2ft. 8in. x 1½in. 28/6 6ft. 10in. x 2ft. 10in. x 1¾in 41/–
Ditto, 1¾in. ... ... 35/– 7ft. 0in. x 3ft. 0in. x 1¾in. 43/6
If in Redwood, 2/–. Packed for safe carriage, 2/– extra.

Bead and Butt.

REDWOOD OR OREGON.

6-8 x 2-8 x 1½in.... ... 45/6 6-10 x 2-10 x 1¾in.... ... 53/6
6-8 x 2-8 x 1¾in.... ... 50/6 7-0 x 3-0 x 1¾in.... ... 57/6
Ledge Doors—Pine ... ... each 18/– to 23/–

Framed Ledge.

OREGON OR PINE.

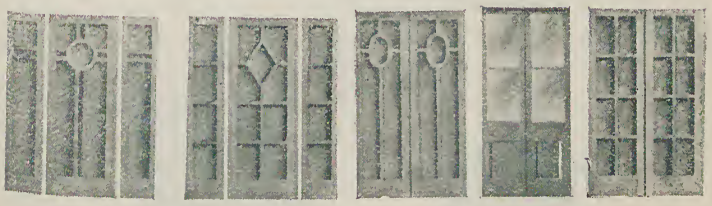
	each		each
6-8 x 2-8 x 1¾in.... ...	37/6	7-0 x 3-0 x 1¾in.... ...	47/6
6-10 x 2-10 x 1¾in.... ...	46/6	7-0 x 3-0 x 2in.	47/6

RIVERSIDE DOORS (12 or 15 Lights).

CLEAR OREGON.

6ft. 8in. x 2ft. 8in. x 1¾in. 35/6 7ft. 0in. x 3ft 0in. x 1¾in. 41/–
6ft. 10in. x 2ft. 10in. x 1¾in. 37/6
Add 4/– for Square Fillets, 8 or 10 Lights, 2/– less, Redwood, extra 2/– each.

FRONT DOORS.



Riverside Doors (Pairs) (20 Lights).

7ft. x 3ft. x 1¾in. ... ... 55/– 7ft. x 4ft. x 1¾in. 69/–
7ft. x 3ft. 6in. x 1¾in. 62/–

Add 6/– for Square Fillets.

EXAMPLE COST OF

Ordinary Front Door Opening fixed complete.

With side lights, fanlights, architraves, stops, locks and fixings complete. Reckon joinery from 6/– to 8/– per sq. ft. Size 8ft. x 5ft. x 1¾, — 40ft. surface x 8/– ... £16 0 0

EXAMPLE COST OF INTERNAL DOOR.

Internal 4 pan. Door, fixed complete.

	£	s.	d.
6ft. 8in. x 2ft. 8in. x 1½in.	1	5	6
Set Single Jamb Linings, 1½in.	0	12	6
2 sets architraves	0	9	0
Material	£2	7	0
Labor, 6 hours at 2/9	0	16	6
Lock set, 10/6; hinges and nails, 2/-	0	12	6
Profit and incidentals	1	4	0
	£5	0	0

Cost of Internal Door, overall measurement.

7ft. x 3ft. — 21 s. feet, including architraves, — about 5/- per sq. ft.

EXAMPLE COST OF

Back Door and Fanlight, fixed.

Overall size opening including architraves, 8ft. 4in high x 3ft. 4in. wide — 28 sq. feet.

	£	s.	d.
Flush pan. door	2	5	0
5ft. x 3in. H.W. frame, with transom	1	18	0
Glazed fanlight, 2ft. 8in. x 1ft. 2in. x 1in.	0	9	0
1 set 4in. architraves	0	6	0
Hinges, furniture	0	10	6
Labor, 6 hours at 2/9	0	16	6
	£6	5	0
Add profit and incidentals	1	5	0
28 s. feet at 5/- — £7.	£7	10	0

Ready to Erect Cottages, 3 rooms and out offices from ... £250
Garages from £45 (floors and foundations not included).

Cost of Labor, erecting and finishing :—Cottages, from £150; Garages, from £15.

Advt. pp. 22, 30, 35, 38.

HAND MADE BOX FRAMES AND SASHES.

Labor at 2/9 per hour.

Not glazed, material at 4d. per foot super net.

	Materials. s. d.	Labour. s. d.
Pine cased frames, *hardwood* sunk sills, 1½ in moulded sashes, double hung, brass-cased pulleys, patent lines and iron weights	0 10	3 0
Deal-cased frames *hardwood* sunk sills, 1¾ inch moulded sashes, double hung, brass cased pulleys, &c., as above	0 11	3 3
Deal-cased frames, double hung, with 2 inch sashes, &c., as before...	1 0	3 6
Ditto, with semi-circular head and span-drills, to show square inside	1 0	5 0
Ventilator (small), frame 2 x 1½ blades 2 x ½, 3 inches apart	0 6	7 6
VENETIAN deal-cased frames, *hardwood* sunk sills, 1½ inch moulded sashes, double hung, &c., as above ...	1 0	3 0
Ditto, with 2 inch sashes, ditto	1 1	3 6
Ditto, with 2½ inch sashes, ditto	1 2	4 0

Box Frames, Sashes, per square foot.

	£ s. d.
Machine stock sizes, sashes 6ft. x 3ft. 6in. x 1½ ; Box frame...	2 3 0
Pair sashes (glazed), 42/– ; nosing, &c., 4/–	2 6 0
18ft. of 5in. Architraves at 30/– per 100	0 6 0
Weights, fittings, cords and nails	0 14 0
Labor, fixing, one man 4 hours at 2/9	0 11 0
Or 21ft. at 5/9 per square foot net	6 0 0
Painting, 3 coats, say	0 12 0
Profit to be added, 10 per cent. At least	0 12 0
21ft. at 6/6 per foot square	£7 4 0

In tendering, reckon finished work from 5/6 to 7/6 per square foot.

Example cost—Verandah or Balcony Enclosure, sliding sashes, 4ft. high x 8ft. spans, three shases 1¾in. thick, glass 21 oz., H.W. sill and head framed between ver. posts, painted, complete—net cost per sq. ft. £0 4 0

PARTITIONS.

	Materials only s. d.	Labor only s. d.
1in. **T. and G. Oregon Partition** vert. boards, 4 x $\frac{7}{8}$, with centre ledge, torus md. 2in. x 2in. both sides, next ceiling, secured at foot with 6in. skirting both sides	0 6	0 3
(*See Example Below.*)		
$1\frac{1}{2}$in. panelled partition, single moulded	0 9	2 0
Ditto, moulded both sides	0 9	2 2
2in., square-framed partition, in 4ft. x 18in. panels ...	1 0	2 2
Ditto, moulded and square panels	1 0	2 4
Ditto, moulded both sides	1 0	2 6
Smaller panels extra to framing	1 2	2 8

Example—One square of partition per first item reckoned out :—

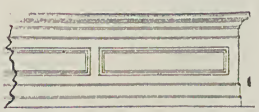
	£ s. d.
100ft. T. and G. dd. and bd. 4in. x $\frac{7}{8}$in. boards, at 40/– ...	2 0 0
10ft. beaded 4in. x 1in. centre-ledge rail	0 2 0
20ft. of 6in. skirting bottom, at 40/–	0 8 0
100 sq. ft. material at –/6 per sq. ft.	2 10 0
,, ,, labour and nails at –/3	1 5 0
,, ,, at –/9 per sq. ft. = ...	£3 15 0

Oregon Studding, per square, for partitions.

AT 25/– PER 100 FEET SUPER.

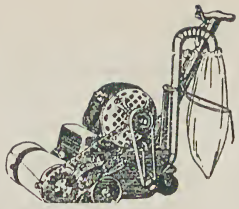
	£ s. d.
3in. x 2in. studs, 2 feet apart, with top and bottom plates = 80 feet 3in. x 2in. studs and plates at –/3	1 0 0
Oregon battens, 60ft. 2in. x 1in., at 5/–	0 3 6
Labor and nails, per square	0 11 6
Net	£1 15 0

COUNTERS.



	£ s. d.
Example cost—Counter, 9ft. long, mock panelled and moulded ; framed front 3ft. x $1\frac{1}{2}$in. thick ; pine top 1ft. 9in. wide x $1\frac{1}{4}$in. thick, covered with linoleum, 5/– per yard per foot run	3 0 0
Example cost—Counter framed, raised md. and panelled pine front, top 2ft. x 2in. thick, with carved brackets every 3ft. apart, per foot run	4 0 0

Counters, 2ft. 6in. wide, from £3 per foot run, plain and framed.



Electric floor surfacers trained operators for hire. Garnet Paper supplied. for the sum of £3 per day of eight hours. These machines usually surface from 200 to 400 square feet per day—depending on the condition of the flooring and the finish desired.

See *advt.*, *p.* 8.

Prices based on: *Dressed timber*, –/4 per ft.; *labor* at 3/– per hour.

	per foot super. Materials. s. d.	Labor fixing. s. d.
Spandrils—Dadoes.		
1¼in. moulded panelling, wrought one face	0 6	1 8
If less than 3ft. panels, as raking to stairs, add ...	0 1	0 6
If raised, moulded, add	0 2	0 4
Mock panelling about 40 per cent. less for labor.		
Framed Panelling, double-faced, 3ft. panels.		
1½in. deal moulded or square	0 6	2 4
Bead flush and bead butt	0 6	2 6
For every ¼in. thick, add	0 2	0 2
1½in. ditto, circular openings	1 0	4 0

STAIRCASES.

	Complete, per storey. £ s. d.	£ s. d.
12 feet rise.		
Common stairs, oregon, close strings, 1 flight	13 0 0 to	14 0 0
Dog leg stairs, open strings	16 0 0	18 0 0
Stairs, with open strings, return nosings, continued handrail steps about 3½ft. long, 12ft. rooms	28 6 0	30 0 0
Geometrical stairs, with single rail, steps about 5ft. long, ditto	36 0 0	42 0 0
Ditto ditto per step ...	2 10 0	3 10 0

Staircases.	*Per foot super.* Materials. s. d.	Labor, fixing. s. d.
Inch wgt. steps, risers, and two carriages	0 6	1 4
1¼in. wgt. deal steps, risers, and two carriages ...	0 7	1 5
Ditto, glued, nailed and blocked, with moulded nosings	0 8	1 10
Ditto, mitred to cut string and dove-tailed for balusters	0 9	2 5
Ditto do. and bracketed ...	0 9	4 8
1¼ squared framed spandrils, one side dressed ...	0 6	1 8
Ditto moulded or bead butt	0 7	2 0
3ft. stair (pine), straight flight between walls, fixed ...	£2 per tread	

STAIRCASES.

Extra Items, each.

	Materials. s. d.	Labor. s. d.
Quarter bullnose step glued upright	1 9	12 6
Full bullnose step and riser	3 0	60 0
Returned moulded and mitred nosings	0 3	5 0
Ditto, circular	0 4	8 0
Plain cut brackets, stock pattern	1 3	5 0

String Boards.

	Per foot super. s. d.	s. d.
1¼ inch plain wall string	0 5	1 6
1½ inch ditto ditto	0 6	1 8
2 inch ditto ditto	0 8	2 0
If moulded, add	0 2	0 4
Oregon, 1¼ inch deal, plain outside string, rebated, beaded and framed to newels	0 5	2 0
Ditto sunk and beaded, or moulded	0 5	2 4
Ditto, and mitred to risers	0 5	2 6

Writhed strings, or facia, four times the price of straight for labor and twice for material.

For maple and mahogany, see relative value, Carpenter Section.

Hand Rails, Balusters, Newels, etc.

Maple at 1/3 per s. ft., Labor at 2/6

	Materials. s. d.	Labor. s. d.	*Per lin. foot.* Total. s. d.
Maple oval 4-inch handrail sunk ...	1 0	2 6	— 3 6
Pine moulded handrail ditto ...	0 6	2 0	— 2 6
Ditto do. ramped	1 6	3 6	— 4 0
Ditto swan-neck, or level circular	1 9	4 6	— 6 3
Ditto, solid writhed	2 0	6 0	— 8 0

Half-rails, two-thirds of the whole.

Maple handrail 3in. x 1½in., oval polished to spiral stairs, screwed to iron band, per foot run, fixed...	0 7 6
Ramps to same	0 14 0
Maple handrail 5in. x 4in., special, fixed and polished	0 16 6
Ramps for ditto ditto	1 14 6

Pine or oregon Handrails stock 4in. x 3in., 92/– per 100 ft. run.

Balusters 1½in. x 1½in. — 16/–; 2 x 2, 20/– per doz.

NEWELS AND BALUSTERS.

	Materials. s. d.	Labor. s. d.
Newel 4-inch mill stock pattern, 5ft. each	10 6	5 0
4in. turned tops or drops for newels, each		5 0
Labor, fixing iron newels, 2½in. dia. x 5ft., each ...		5 0
Ditto iron balusters, light, each	0 0	2 6
Ditto stays, ditto	0 0	1 6

Iron newels, balusters, and stays, charged extra at per lb.

SKIRTINGS, ARCHITRAVES.

Including plugging.

Machine made and fixed complete.

	4 inch. s. d.	5 inch. s. d.	6 inch. s. d.	7 inch. s. d.	8 inch. s. d.
Skirtings, moulded	0 5	0 6	0 7	0 9	0 10
Architraves, single faced ...	0 6	0 7	0 8	0 11	1 0
Ditto, double faced ...	9 inch	12 inch	14 inch	16 inch	18 inch
Skirtings, double sunk ...		1 0	1 3	1 4	1 6

If made by hand, add one-fourth to these prices.

Fixing architraves or skirtings, costs from 4d. per lineal foot, including plugging and redressing and mitering for 5 inch architraves or 8 inch skirting.

Large Mouldings.

	per super foot. s. d. s. d.
Base, surbase, double architraves, cornice, and skirting mouldings	1 0 to 2 0
Ditto, if worked by hand...	1 6 to 3 0
Church Gothic cornices, worked by hand	2 0 to 3 0

Labour, fixing mouldings from –/1d. per foot, according to lengths, junctions and size.

Shelving for Library or large quantities 12in. x 1in. White Pine, N.Z. Pine, with 2in. x 1in. nosing, cedar or maple, partitions 5ft. apart, White Pine, 9d. per foot, per sup. foot, 1/4. Carpenter's wage, 2/9 per hour.

Roof Ventilators.

Joiner's Wage, 2/9 per hour.

	Material. s. d.	Labor. s. d.
Ventilator for side of roof, 3 feet equilateral triangle, and 4 ft. ridge-roll frame 2 x 1½ nailed together, and filled with 3½ x ¾ Louvre, sides covered with redwood T. and G. flooring		44 0
Front of Pews, 8 ft. x 2 ft. 9in. x 1½ in. stiles muntins and rails stop chamfered on face, also 6 diagonal V grooved 1 in. panels, flush and chamfered at back, per foot super... ...		3 0
Pew backs, 8 ft. x 20 ins. x 1½ in. face stop chamfered, three 1 in. bead and flush panels, per foot super		3 0
Seat for ditto, 8 ft. x 12 ins. x 1½ in., with rounded edge, supported at ends and by 2 seats, per foot run		2 0
Pew backs, open, as before, without panels, per foot run ...		2 6

Church seats, Pine, from 10/– per foot run, 8 feet long, including stall ends, 20/–.

For further prices, *see advt., p.* 35.

PLUGGING.

The old method of **wood** and **joint** plugging with damage to walls that involve plastering up and making good has been superseded by the working of the pneumatic drill-bit and new Rawlplug method, especially when tiled walls, or fine expensive surfaces have to be punctured for fixtures. Rawl plugs hold better, requires from one half to three quarters less time to instal. The plug being in the solid substance, of wall and not in a joint hold better. They do not damage the walls or existing decorations. By a small hammer and Rawl drill, the hole required is drilled smaller than the head of screw required.

THE "KANGO" ELECTRIC MECHANICAL HAMMER.

Weight, 9¼ lbs. Price, £36.

Power required, 110 to 250 volts. Speed, 3,000 blows to minute.

Cost of running, 1d. per hour current.

Special bits for drilling in **brick, marble,** concrete, slate, breeze, tiles, plaster, or cement.

See advt., p. 5.

Relative drilling speeds with 9¼ lb. "Kango" Hammer, 300 volts.

Per minute inches.

Material.	⅝ dia. inches.	1 in. dia. inches.
Good Red Brick ...	9	4
Sandstone	4	2⅕
Marble...	2	1¼
Granite	1¼	¾

Cuts time taken from strip of mild steel, 3/16 in. thick with electric drill.

6 inches long, 1/16 in. deep	33½ seconds
6 inches long, ⅛ deep	51 ,,
10 inches long, 3/32 deep	45 ,,

The "Kango" Electric Hammer drives a spline shaft operating two crown wheels revolving in oil in opposite directions, the counter weights being at the top and bottom of the revolutions. A strong spiral spring serves to control and absorb oscillation. The downward movement is free to convey the full impact to the transmitter, thus providing the blows that operate the tool. A.C. or D. current can be used from 110 to 300 volts like other electric and pneumatic tools. (*See* Electric Section).

Some uses of the Hammer.—Chipping steel, trimming castings, panel beating, boiler scaling, carving, chiselling, shaping wood or composition, cutting, dressing, drilling holes of any size in plaster, cement, granite, stone, brickwork, concrete, etc.

RAWLPLUG PRICES.

Size No.	Suitable Sizes of screws	LENGTH OF RAWLPLUGS. ½″	⅝″	¾″	1″	1½″	2″	2½″	Assorted Lengths per 100.
3	No. 3, 2 and 1	2/3	2/5	2/7	2/11	—	—		2/7
6	,, 6, 5 ,, 4	2/6	2/7	2/11	3/4	—	—		2/11
8	,, 8 ,, 7	2/11	3/4	3/6	4/–	4/11	5/9		4/2
10	,, 10 ,, 9	3/8	3/8	3/10	4/6	5/7	6/9		4/11
12	,, 12 ,, 11	—	—	4/8	5/3	6/7	7/10		5/9
14	,, 14 ,, 13	—	—	5/7	6/2	7/10	9/3		7/4
Larger sizes of Rawlplugs No. 16, 18 and 20 in boxes of 50 only.									
16	No. 16 and 15	—	—	—	4/2	5/1	6/1	7/1	5/9
18	,, 18 ,, 17	—	—	—	5/–	6/1	7/2	8/3	7/–
20	,, 20 ,, 19	—	—	—	5/11	7/–	8/3	9/10	8/3

Rawlplug Outfits.

Complete Trial Outfit, Rawlplugs and Tools, from Nos. 3—20 screw gauge, etc. £2/17/6

Household Outfit, contains 50 No. 8 Rawlplugs, Toolholder and Bit and screws 4/6

MECHANIC'S OUTFITS Size No.	3	6	8	10	12	14	16*	18*	20*
100 Rawlplugs assorted, Toolholder, Bits and a supply of Screws, Hooks, etc. ...	5/6	6/–	7/–	7/6	9/–	10/–	9/–	10/–	11/6

*Nos. 16, 18 and 20 Mechanic's Outfits have 50 plugs.

Tool Kit, containing 1 each Toolholder Nos. 8, 14 and 20, one each Adaptable Jumping Bits, Nos. 3 to 20, Bit Ejectors, and Screw Gauge, complete in leather tool roll... ... ... 15/–

Mechanic's Outfit, No. 8 equipped with Recess Screws and Driver 7/–

Bits (or Drills).

Jumping Bits (or Percussion Drills) are for use in brick, concrete, tile, or in any hard material. They have special fluting through which the dust is automatically ejected from the hole being made. This ensures a perfect hole and prevents the tool from wedging.

The Bullet Bits are for use in plaster or any soft material. They are so made to displace material tightly against the sides of the hole to strengthen it, which is an important point when working on soft plasters.

The Jumping Bits are ground to an angle for re-sharpening on any hone or grindstone.

Comparison: Hand hammer, 30 blows to minute; Machine, 3,000 blows.

Prices of Bits (per dozen).

Nos.	3	6	8	10	12	14	16	18	20	22	24	26	28
Bullet Bits	3/2	3/7	4/3	4/11									
Jumping Bits	3/4	3/10	4/4	5/1	5/11	7/–	8/11	10/10	12/9	17/6	22/6	27/8	37/8

Adaptable Bits or Drills.

For work on which only one or two sizes of screws are used at a time the standard Bits are advised.

	No. 8 Toolholder			No. 14 Toolholder			No. 20 Toolholder		
Nos.	3	6	8	10	12	14	16	18	20
Bullet Bits per dozen	3/6	3/8	4/3	5/7	—	—	—	—	—
Jumping Bits ...	3/7	4/3	—	6/3	6/8	—	11/4	12/1	—

Toolholders Nos. 8 and 14, 20/– per doz.; No. 20, 23/– per doz.

Rawlplug Gauges ensure the use of the correct size of plug to suit any screw. Price, 4d. each.

MEASURE IF SURFACE.

144 Sq. Inches	equal 1 Sq. Foot	40 Sq. Lods	equal 1 Rood
9 Sq. Feet	,, 1 Sq. Yard	4 Roods	,, 1 Acre
30¼ Sq. Yards	,, 1 Sq. Rod	10 Sq. Chains	,, 1 Acre
16 Sq. Rods	,, 1 Sq. Chain	640 Acres	,, 1 Sq. Mile

1 Acre contains 100,000 sq. Links.

1 ,, ,, 4,840 Sq. Yards.

A square whose side is 69½ Yards is approximately 1 Acre.

TURNERS' WORK.

Turners' wages, 2s. 9d. per hour, and Clear Pine 5d. per sup. foot.

Per pair.	Labour only.		Clear Pine.	
	s.	d.	s.	d.
Tuscan base and Capital for 6 inch column ...	5	0	1	0
Ditto ditto 9 inch column ...	7	0	2	6
Ditto ditto 12 inch column ...	9	0	5	0
Doric base and capital for 6 inch column ...	7	0	1	0
Ditto ditto 9 inch do. ...	9	0	2	6
Ditto ditto 12 inch do. ...	11	6	5	0

Each.	Labour only.		Clear Pine.	
	s.	d.	s.	d.
Ionic base for 6 inch column (major diam.)	6	8	0	8
Ditto 9 inch column	8	0	1	6
Ditto 12 inch column	9	4	3	0
Corinthian or Composite base for 6 in. column ...	8	0	0	8
Ditto ditto 9 in. do.	10	0	1	6
Ditto ditto 12 in. do.	12	0	3	0
Ditto capital for carving 6 in. do.	5	4	1	6
Ditto ditto 9 in. do.	9	4	3	0
Ditto ditto 12 in. do.	13	4	6	0
Newels 3 in. diameter and 4 feet long ...	3	0	1	4
4 in. ditto ditto ...	5	0	2	6
5 in. ditto ditto ...	6	0	3	0
6 in. ditto ditto ...	10	0	4	0
8 in. ditto ditto ...	15	0	7	6
10 in. ditto ditto ...	27	0	12	0
Balusters ordinary for staircases, 2 in. diam. ...	1	4	0	3
Ditto best ditto ditto ...	2	0	0	3½
Ditto, best with spiral column, ditto	8	0	0	4
Ditto for parapets, loggias, &c., 3 in. diameter and 12 ins. high	2	0	0	4
Ditto 4½ in. diameter and 18 ins. high	4	0	0	11
Ditto 6 in. do. and 24 ins. do.	6	8	2	0
Solid ball for finial, &c. 4 ins. diameter ...	5	4	0	6
Ditto do. 8 ins do.	8	0	1	8
Ditto do. 12 ins. do.	10	8	4	0

BRITISH EQUIVALENTS OF FOREIGN WEIGHTS AND MEASURES.

The following may be regarded as the approximate equivalents.

LINEAL MEASURE	AVOIRDUPOIS MEASURE
1 Millimetre = 1/25 Inch	1 Kilogramme = 2½ lbs.
2½ Centimetres = 1 inch	1000 ,, = 1 ton
1 Metre = 39⅜ inches	SQUARE MEASURE
1 Kilometre = 5 furlongs	6½ Sq. Centimetres = 1 sq. inch
1⅜ ,, = 1 mile	1 Sq. Metre = 10¾ sq. feet

LINEAL MEASUREMENTS, BRITISH AND FOREIGN.

1 inch = 2.54 centimetres	1 chain = 20.1168 metres
1 foot = 30.4699 centimetres	1 chain = 66 ft. = 100 links
1 yard = .914499 metre	1 mile = 5280 feet = 80 chains
1 mile = 1.6093 kilometres	1 knot = 6080 ft. per hour

METRIC WEIGHTS AND MEASURES.

Lineal Measures.

The unit for length is the Metre.

	Yds.	Ft.	In.	
10 Millimetres or	0	0	0.3937	equal 1 Centimetre
10 Centimetres or	0	0	3.9370	,, 1 Decimetre
10 Decimetres or	1	0	3.3708	,, 1 METRE
10 Metres or	10	2	9.7079	,, 1 Decametre
10 Decametres or	109	1	1.079	,, 1 Hectometre
10 Hectometres or	1093	1	10.79	,, 1 Kilometre

Weight.

The unit for weight is the Gramme.

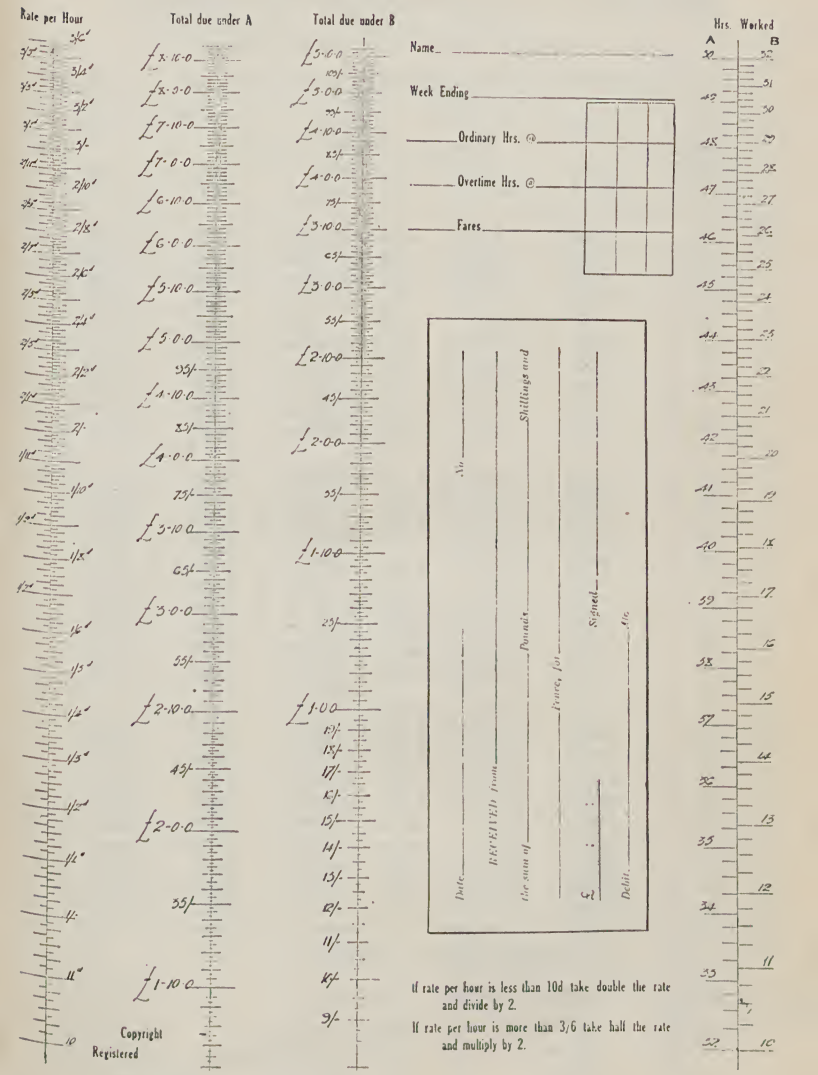
	Lb.	Oz.	Drams.
10 Milligrammes or	0	0	0.0056438 equal 1 Centigram
10 Centigrammes or	0	0	0.056438 equal 1 Decigramme
10 Decigrammes or	0	0	0.56438 equal 1 Gramme
10 Grammes or	0	0	5.6438 eqi l 1 Decagramme
10 Decagrammes or	0	3	6.438 equal 1 Hectogramme.
10 Hectogrammes or	2	3	4.38 equal 1 Kilogramme.

A Milligramme measures .01543 of a Grain.

ANGLES, Degrees and tenths for opening of a Two-foot Rule, in inches and quarters.

Ins.	Degrees	Ins.	Degrees.	Ins.	Degrees	Ins.	Degrees	Ins.	Degrees
¼	2.4	4¼	20.4	8	39.0	11¾	58.6	15½	80.4
½	3.6	½	21.6	¼	40.2	12	60.0	¾	82.0
¾	4.8	¾	22.8	½	41.5	¼	61.4	16	83.6
1	6.0	5	24.0	¾	42.8	½	62.8	¼	85.2
¼	7.2	¼	25.3	9	44.0	¾	64.2	½	86.9
½	8.4	½	26.5	¼	45.3	13	65.6	¾	88.5
¾	9.6	¾	27.7	½	46.6	¼	67.0	17	90.2
2	10.8	6	29.0	¾	47.9	½	68.5	¼	91.9
¼	12.0	¼	30.2	10	49.2	¾	69.9	½	93.6
½	13.2	½	31.4	¼	50.6	14	71.4	¾	95.4
¾	14.4	¾	32.7	½	51.9	¼	72.9	18	97.2
3	15.6	7	33.9	¾	53.2	½	74.3	¼	99.0
¼	16.8	¼	35.2	11	54.6	¾	75.8	½	100.8
½	18.0	½	36.4	¼	55.9	15	77.4	¾	102.7
¾	19.2	¾	37.7	½	57.3	¼	78.9	19	104.7

N.B.—The tenth of 1 degree varies from one-fiftieth to one-eightieth of an inch.


Rate per Hour
Total due under A
Total due under B
Name
Week Ending
Ordinary Hrs. @
Overtime Hrs. @
Fares
Hrs. Worked
A
B
No.
Shillings and
Pounds
Pence, for
Signed
No.
Date
RECEIVED from
the sum of
£
s.
d.
Debit
If rate per hour is less than 10d take double the rate and divide by 2.
If rate per hour is more than 3/6 take half the rate and multiply by 2.
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BRICKWORK CF VARIOUS HEIGHT AND THICKNESS.

M. S. Stanley, A.M.I.E.A., Concrete Engineer.

WEIGHT OF BRICK WALLS IN POUNDS.

Height of Wall in ft.	Thickness of Wall in inches.					
	4½″	9″	13½″	18″	22½″	27″
1	42	84	126	168	210	252
2	84	168	252	336	420	504
3	126	252	378	504	630	756
4	168	336	504	672	840	1008
5	210	420	630	840	1050	1260
6	252	504	756	1008	1260	1512
7	294	588	882	1176	1470	1764
8	336	672	1008	1344	1680	2016
9	378	756	1134	1512	1890	2268
10	420	840	1260	1690	2100	2520
11	462	924	1386	1848	2310	2772
12	504	1008	1512	2016	2520	3024
13	546	1092	1638	2184	2730	3276
14	588	1176	1764	2352	2940	3528
15	630	1260	1890	2520	3150	3780
16	672	1344	2016	2688	3360	4032
17	714	1428	2142	2856	3570	4284
18	756	1512	2268	3024	3780	4536
19	798	1596	2394	3192	3990	4788
20	840	1680	2520	3360	4200	5040
21	882	1764	2646	3528	4410	5292
22	924	1848	2772	3696	4620	5544
23	966	1932	2898	3864	4830	5796
24	1008	2016	3024	4032	5040	6048
25	1050	2100	3150	4200	5250	6300
26	1092	2184	3276	4368	5460	6552
27	1134	2268	3402	4536	5670	6804
28	1176	2352	3528	4704	5880	7056
29	1218	2436	3654	4872	6090	7308
30	1260	2520	3780	5040	6300	7560

MEASURE OF SOLIDITY.

1,728	Cubic	Inches	equal	1 Cubic Foot
27	,,	Feet	,,	1 Cubic Yard
5	,,	Feet	,,	1 Barrel Bulk Shipping
40	,,	Feet	,,	1 Ton Shipping (Merchandise)
42	,,	Feet	,,	1 Ton Shipping (Timber)

CAPACITIES OF ROUND GRAIN TANKS OR SILOS.

IN BUSHELS OF WHEAT.

M. S. Stanley, C.E. Concrete Engineer.

Height of Silo	Diameter of Silos in feet.			
	10 feet.	12 feet.	14 feet.	16 feet.
30	1893	2726	3710	4846
32	2019	2908	3958	5169
34	2145	3089	4205	5492
36	2272	3271	4452	5815
38	2398	3453	4700	6138
40	2524	3634	4947	6461
42	2650	3816	5194	6784
44	2776	3998	5442	7107
46	2903	4180	5689	7431
48	3029	4361	5936	7754
50	3155	4543	6184	8077
52	3281	4725	6431	8400
54	3407	4907	6678	8723
56	3534	5088	6926	9046
58	3660	5270	7173	9369
60	3786	5452	7420	9692
62	3912	5633	7668	10015
64	4038	5815	7915	10338
66	4165	5997	8162	10661
68	4291	6179	8410	10984
70	4417	6360	8657	11307
72	4543	6542	8905	11630
74	4669	6724	9152	11953
76	4796	6906	9399	12277
78	4922	7088	9645	12599
80	5048	7270	9891	12921
82	5174	7452	10137	13243
84	5300	7634	10383	13565
86	5426	7816	10629	13887
88	5552	7998	10875	14209
90	5678	8180	11121	14531
Bushels per foot of height	63	90	123	161
Deduct for Hoppered Bottom	160	281	445	661

Pitch of Hoppered Floor, 37½ Degrees.

Hydrated lime, used as builders' lime for Plastering work, retarding the setting of concrete, waterproofing, etc.
Lump limestone, ground fine as flour to 150 mesh and treated. The addition of 10 per cent. to 15 per cent. of hydrated lime to cement concrete has a tendency to check air cracks in drying, as it absorbs water and holds it till the slower acting cement dries. Obtained in 1 cwt. bags. Price £4 10s. to £6 15s. per ton. Agents, 4 Bridge Street, Sydney. Works, Mount Frome, Mudgee.

CAPACITIES OF ROUND GRAIN TANKS OR SILOS.

IN BUSHELS OF WHEAT.

M. S. Stanley, C.E. Concrete Engineer.

Height of Silo	Diameter of Silos in feet.			
	16 feet.	20 feet.	22 feet.	24 fe t.
36	7360			
38	7769			
40	8178	10096		
42	8586	10600	12827	
44	8995	11105	13438	15962
46	9404	11610	14048	16719
48	9813	12115	14659	17446
50	10222	12620	15270	18172
52	10631	13125	15881	18899
54	11040	13629	16492	19626
56	11449	14134	17102	20353
58	11858	14139	17713	21080
60	12266	15144	18324	21807
62	12675	15649	18935	22534
64	13084	16153	19546	23261
66	13493	16658	20156	23988
68	13902	17163	20767	24715
70	14311	17668	21378	25441
72	14720	18172	21989	26168
74	15129	18677	22599	26895
76	15537	19182	23210	27622
78	15945	19686	23820	28348
80	16353	20190	24430	29034
82	16761	20694	25040	29800
84	17169	21198	25650	30526
86	17577	21702	26260	31252
88	17985	22206	26870	31978
90	18393	22710	27480	32704
Bushel per foot of height	204	252	305	363
Deduct for Hoppered Bottom	904	1284	1723	2232

Pitch of Hoppered Floor, 37½ Degrees.

"**Medusa**" **White Portland Cement,** mixed with its water proofing powder, -/3½ per lb. Price per lb. plain, -/3 per lb. or 60/- to 70/- per 3 cwt. cask. *See Plastering Section.*

Ferrocrete Cement. A rapid hardening cement said to be 7 times quicker in hardening than ordinary cement concrete, viz., in the proportion of 4 to 28 days of cement and the strength of 6:3:1 mixture = to 4:2:1 Portland Cement. Price, from Dickson Premel & Co., 35 Pitt St., Sydney.

CARTAGE AND TRANSPORT.

Wages with Dray at 28/– per day of 8 hours.

	s.	d.
Carting bricks, including loading and unloading, one mile per 1000, with 1-horse loads	5 1	 0
Ditto, add for each mile beyond, per 1000	2	6
Ditto, with 1-horse drays, ditto	17	0
Ditto, for each extra mile	3	6
Carting slates, sand, lime, or rubbish, per load for one mile, including loading and unloading	6	0
Ditto, add for each mile beyond, per load	3	6
Carting scaffolding, per load, for one mile, including loading and unloading	10	0
Ditto, for each mile beyond first mile, per load	3	6

Wages, 2 horse dray, 30/– per day. Every extra horse, 6/– to 4/– every day.

Contractors must allot a price per load that will allow of every carter to make at least 28/– per day, single dray.

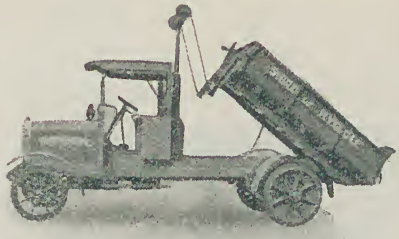
Motor Lorry and driver, 2 ton, hire at £4 per day, petrol, 2/3 per gal., oil, 2/– quart.

Motor Lorry, 1 ton (new) say "Morris" motor truck or "International" make. Cost of running (petrol, oil, tyres, wear and tear), first 10,000 miles, –/4½ per mile, second to 25,000 miles, –/6 per mile, after 20,000 from –/8 running and depreciation.

Wages of motor driver, 3/– per hour, for large traction motors. Award rates, £4/10/– per week for 1 ton trucks.

A good driver on ordinary roads can run lorry on 20 miles to gallon.

5 ton motor tractor.
Dumping, say 15 mins.
Loading from hopper, 10 minutes.
Hauling, per mile, 1/4.



Motor with Tipping Hydraulic Hoist.

See Advt. pp. 13, 19.

	Price from £800 per ton load.	per cub. yd. of muck.
Haulage of material by carts drawing one way only.		
Loading from ground, –/8, dumping, –/2... ...	–/10	1/3
Hauling per ½ mile	1/2	1/9
	2/–	3/–

Metal loading from truck, 8 minutes.
Metal loading from ground, 10 to 12 minutes per ton of metal.

A 15-18 cwt. say "Dodge" tipping truck costs £300, self-starter electric light, complete. 1 ton costs £380. 4 ton Chassis, £450.

1 ton "Ford" motor truck, bush roads upkeep, 30/–.

Hire of 1 ton truck and driver per hour, 6/–.

Example—Brick Carting.

A 5 ton motor table truck delivered 1000 bricks per load, 4 miles to job (level road, from Alexandria to Maroubra). Loading and unloading, 4 journeys in 8 hours; returns empty. Total, 32 miles per day.

Reckon other building materials the same.

MOTOR TRUCKS PRICES.

"*Republic*," with chain tip, double cross-head, 1¼ tons, £445, 1½ tons, £495, 2 tons, £585, 3 tons, £725, 4½ tons, £935.

CARTAGE, PER TON.

28/– per day.

	s. d.
Cartage on bad roads, per ton, per mile, over 15 miles ...	2s. to 4 0
Ditto, on good roads, ditto, ditto	1/6 to 2 0
Freight by coasting steamers do., do.	0 0½

A horse can draw about 8 tons on an ordinary railway, and 4 tons on a horse-railway, with 6in. x 3in. hardwood rails.

RAILWAY FREIGHT.

Sawn or dressed timber loaded in lots of 8 tons and over, A Rate.

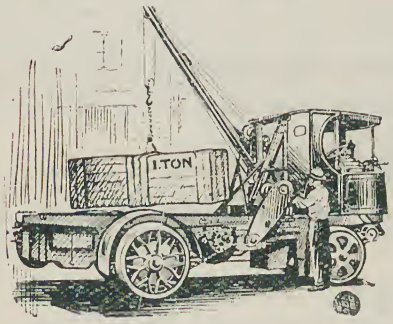
Sawn or dressed timber loaded in lots of less than 8 tons, A Rate plus 50 per cent.

Mouldings, B Rate.

The maximum length allowed at above rates is 27ft. For lengths over 27ft. a special truck must be provided, with a minimum charge of 4 tons at A Rate plus 50 per cent.

TRANSPORT.

The modern haulage wagon is required to give a high average speed, fast speed on hills, must be easy to control, and economical to run.



Steam Wagons. For loads of 3 tons and over, the steam wagon is one of the cheapest means of transport.

4 tons capacity, 4 cub. yds., approx. price, £1100 to £1350 ; 6 ton capacity, 6 cub. yds., approx. price, £1235 to £1440.

For further particulars, please refer to *advt.*, *pp.* 13, 19.

Fuel cost, from 1d. per mile.

Loading Devices prevent the loss of time which occurs when it is necessary for any vehicle to stand at a loading point while blue metal, sand or other material is being shovelled in. 4-ton steam wagons or motor vehicles can be loaded in two minutes.

The hopper can be filled in readiness. thus reducing cost of fuel and transport.

Mounted on heavy steel wheels for towing behind lorries. When unloading railway trucks, can be moved without trouble from one to another.

The bin when full is raised so that a vehicle may be backed directly underneath. It facilitates transport capacity of motor vehicles considerably.

Capacity		Price.
4 cub. yds.	... ...	£295.
6 „	... ...	to
8 „	... ...	£310.

LOADING DEVICES AND TRACTORS.

Loaders for handling all classes of Loose Material, Crushed Blocks, Gravel, Sand, also Coal and Coke.

PORTABLE BELT CONVEYORS.

From 20 feet long to 60 feet long. Price, about 20/- per foot run from 200 to 600.

Portable Railway Truck or Trolley Waggon Loader, belt and buckets or receivers mounted on wheels or caterpillar traction as desired (*see design*).

According to capacity and particular conditions of loading, or unattended in degree, £800 to £1,500.

Transport, 2 horse and trolley load Trachite City = 12 blocks of trachite, 4ft. x 1ft. 6in. x 9in. = 72 s. ft. x 9 = 51 cubic ft.

The Cartage Rates of Transport in both Sydney and Melbourne are governed by a fixed schedule by the Master Carriers' Associations.

The general rate for measurement of goods is about ¼/¾ **per ship's ton of 40 cubic feet,** and **4/6 per ton dead weight,** plus cost of loading and delays, which would depend upon the handling required in receiving and delivering.

APPROXIMATE FREIGHT RATES (Rail).

Freight cost per ton over following Miles :—

Quantity	Rate per Ton	50			100			150			200			300			400		
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
8 Ton Lots	M.	0	7	11	0	14	2	0	18	4	1	2	6	1	6	8	1	10	0
2 Ton lots	A.	0	13	10	1	4	10	1	12	2	1	19	5	2	6	8	2	12	6
1 Ton lot	B.	0	19	10	1	15	2	2	5	10	2	16	3	3	6	8	3	15	0
Samller Quantities	1st Class	11	1	4	3	0	5	4	5	6	5	8	5	6	13	4	7	10	0

TRANSPORT.

Excavated material on dump waggons being drawn on a contractor's 2ft. 6in. rail track by a petrol driven motor. Cost of tractor, £1,200. *See advt., pp.* 13, 19.

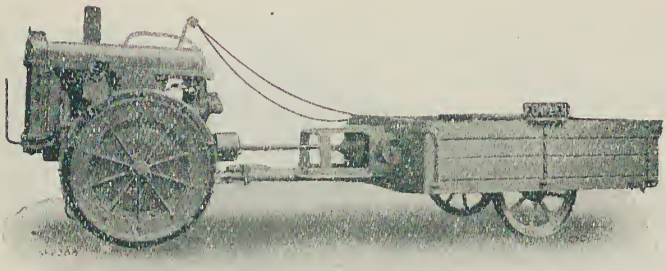
Traction engines, "Rumley" oil pull, 15-25 h.p., £550.

Ball bearings to wheels and broad tyres, 3ft. 6in. driving wheel and 2ft. front wheels, all gears run in oil, baths enclosed, 20-35 h.p., £775.

Contractors' Covering Tarpaulins, Roped and Branded.

Size feet	No. 3 Birkmyre's O M Khaki.	Size feet	No. 3 Birkmyre's O M Khaki.
6 x 8	28/6	18 x 20	210/6
8 x 10	47/6	18 x 24	255/–
10 x 12	70/–	20 x 24	287/6
12 x 14	99/–	22 x 26	340/–
14 x 16	132/6	24 x 26	360/–
16 x 18	170/–	24 x 30	430/–

Or can be hired from 2/– per week.



FOWLER REIN DRIVE TRACTOR.

A Mechanical Horse of Leeds, England.

One man attending to the implement can control both tractor and implement.

The tractor is simply operated with one hand, so that the main attention of the driver, who is removed from the noise, heat and fumes of the tractor, can use his other hand, free to attend to the satisfactory working of the implement, plough, scoop, scarifier, or load.

The tractor is rigidly coupled with a telescoped tubular drawbar to the implement so that it can back or manoeuvre anywhere as required.

Power steerage enabling tractor to turn over into full lock while standing, or in confined places.

When pulling, the rigid connection between tractor and implement avoids all trouble with side draft and allows of backing the machine when choked. Square corners can be cut with excavating machines just as easily as with horses.

The two heavy wheels, which are of the rolling pad type, give perfect traction under all conditions without undue compression of the soil, as the pads form a track for the wheels to roll on (on the caterpillar principle). Wood blocks are also supplied for use on macadam roads.

Rein driving is simple, viz., a **slight jerk** at the reins puts the tractor into forward gear from standing, and the special band clutch takes up the drive quite smoothly. Once started, no difficulty is experienced, as the steering is easily brought about by **pulling the right or left-hand rein.** The angle through which the tractor is turned is controlled by the **length of time** the rein is pulled.

A **steady pull** on both reins at any time stops the tractor and applies the brake, while a further pull back introduces the reverse.

The engine is a two-cylinder vee type, **paraffin or kerosene fuel,** 30 B.H.P. at 1,000 R.P.M., cylinders 5½ x 7½, **wheels** cast steel, 40 in. dia. x 11 in. face. **Trailing truck** of 2 tons capacity, 12 in. clearance of ground. Price of the above, 8 H.F., with truck, £650.

Agents: *Austral Eng. Co.*, 490 *Kent St.*, *Sydney.*

THE CLETRAC CRAWLER TRACTOR, Cleveland, Ohio, U.S.A.
Used by contractors on industrial works, building and **maintaining roads, moving earth, hauling logs and lumber, clearing land, pulling stumps, keeping streets and highways clear of snow, ploughing drains and scooping tanks.**

Being a low caterpillar tractor, 4 ft. 4 in. high x 4 ft. wide x 8 ft. long, it can do the work of 9 horses over any loose country, drawing logs from scrub and supplying the power to saw to cut them in lengths, &c.

An 8 in. belt pulley runs right on an extension of the motor crank shaft, 20 H.P. direct power for belt driven concrete mixer, saw bench, or stone crushers, &c. Speed, from 600 to 1250 R.P.M.

Motor Heavy duty, four cylinder, 4 in. bore overhead valves, one speed, forward and reverse only. **Fuel, gasoline, kerosene, distillate** or **alcohol.** Petrol tank, 12 gal., high tension magneto. Weight, 3580 lbs. Price, £535.

DISTANCES BETWEEN PORTS OF AUSTRALIA (in Miles).

From Lysaght's Tables.

Fremantle.										
1378	**Adelaide.**									
1886	508	**Melbourne.**								
2450	1072	564	**Sydney**							
2960	1582	1074	510	**Brisbane**						
3310	1933	1424	860	350	**Keppel Bay**					
3500	2122	1614	1050	540	190	**Mackay**				
3605	2227	1719	1155	645	295	105	**Bowen**			
3708	2330	1822	1258	748	398	208	103	**Townsville**		
3868	2490	1982	1418	908	558	368	263	160	**Cairns**	
3903	2525	2017	1453	943	593	403	298	195	35	**Port Douglas**
3968	2590	2082	1518	1008	658	468	363	260	100	65 **Cookt'n.**

CEMENT.

PORTLAND CEMENT.

The making of Cement from the raw materials—limestone, clay and shale—together with its intricate tests, are matters for the manufacturer and the civil engineer. But a few remarks on how to use it so as to get the best results may be useful. All good cements are exceedingly fine and heavy, and of a bluish grey colour.

Extract from "Facts and Figures" regarding the use of Concrete. Published by the Commonwealth Portland Cement Co.

Slow setting cement is preferable to quick setting cement for all general purposes.

Cement Mortar.—The cement and clean sharp sand, not too fine, should be thoroughly mixed in a dry state.

Cement mortar of one part of cement and two parts of sand is used when a high degree of strength and density is necessary. Mortar for masonry, plastering, and general purposes, one part cement to three parts of sand is a suitable mixture.

Cement Plastering should not come in contact with wood, unless protected by tar paper, as otherwise the woodwork swells by absorption of water from the cement mortar, leading to cracking of the cement.

A coating of cement and a small proportion of sand may be applied for protecting ironwork from the effects of steam and gas from engines.

Salt water should not be used for stucco work, or for any work in stables, &c., exposed to the effect of ammonia.

All cement mortar or concrete should be used as quickly as possible. Set or hardened cement mortar or concrete is quite useless. Its initial "set" should not be disturbed.

Cement Lime Mortar.—This class of mortar is as yet far too seldom used. The mixture of 1 part cement, 1½ parts lime, and from 3 to 10 parts of sand, gives a mortar of great strength at a low cost.

CONCRETE.

Care should be taken to prevent the quick drying of concrete by protecting it from the direct rays of the sun and sprinkling it from time to time with water.

The best proportions for concrete depend upon local conditions, and should be chosen on the basis of experience and experiment, in accordance with the available materials.

For general purposes a mixture of 1 part cement, 3 parts sand, and 6 parts of broken stone or bricks, will produce good concrete.

All concrete should be carefully rammed to eliminate air pockets.

A surplus of water should be avoided, as the strength and the density is affected. The proportion of water is correct if only after thorough ramming the concrete liquid appears on the surface.

When placing a second layer of concrete, it is advisable to do so before the first is set; otherwise the first layer should be scratched, cleaned and wetted for securing a firm bond.

Concrete Blocks.—When moulding these, the operation should be continuous, and care is necessary to completely and tightly fill in the mould. Pork fat prevents the concrete adhering to the mould. After 24 hours the mould can be carefully removed. The casting must then be protected against sun and draught, and kept wet for some days.

Cement work whould never be applied on dry or absorbent surfaces, unless those surfaces be previously wetted, and when completed must be kept moist for some time to produce the greatest strenth and to avoid shrinkage and cracking.

White sand or marble dust, gives the finished work a lighter tint than ordinary sand.

Coloring matter may also be added to the mixture, but only such materials should be used which resist alkaline reaction.

Other coloring materials used are peroxide of iron, ultramarine, and lampblack. These materials must be well mixed with the cement before water is added.

Cement concrete must first be thoroughly dry and hard before paint is applied. It is advantageous to first put on a coat or two of water glass in 4 parts of water ; when dry apply the paint.

Cement, iron, or steel. when exposed to the same temperature, expand at practically the same ratio ; there need, therefore, be no fear of dislocation—cement protects iron as much against fire as against rust.

Cement is unquestionably the most fireproof material ; whilst wood burns, stone splits, and iron twists, cement resists without injury the highest temperature.

COMPARISON OF SOLID MEASUREMENTS.

1 bushel = 1.28 c. ft. or 4 pecks or 8 gallons = 2 of 4 gal. kerosene tins.
∴ 21.1 bushels = 27 cubic feet or 1 cubic yard.

One cask cement contains $3\frac{1}{2}$ cubic feet or 375 lbs. net, 400 lbs. gross.

Therefore **eight casks** cement contain **28 cubic feet** or **1 foot** over the cubic yard of cement.

9 casks to a double dray load, 32 casks to a truck load.

18 bags of cement at 125 lbs. each = 1 ton.

1 cubic foot of cement = 85 lbs. loosely filled, and 110 lbs. when rammed.

1 cubic foot of cement when mixed with aggregates sand and stone

proportion	cub. ft.
1 : 2 : 4	4.1
1 : $2\frac{1}{2}$: 5	5
1 : 3 : 6	5.8
1 : 4 : 8	7.5

Shrinkage of concrete, 4 : 2 : 1 mix.

One cubic yard material for concrete before mixing in loose shrinks when set in the proportion of 42 to 27 or 14 to 9.

8 lbs. cement mortar will point one square yard of brickwork with $\frac{1}{4}$ inch joints.

Covering Power of One Cubic Yard Concrete or Mortar in Position.

AT A GLANCE.

ONE CUBIC YARD OF MIXED MORTAR, CEMENT OR OTHERWISE PLASTERERS OR DISTRIBUTORS OF SOIL, ASHES, OR MATERIAL.

Will cover	36	square yards	1	inch thick		
,, ,,	18	,, ,,	2	,, ,,		
,, ,,	15	,, ,,	$2\frac{1}{2}$	,, ,,		
,, ,,	12	,, ,,	3	,, ,,		
,, ,,	9	,, ,,	4	,, ,,	say slabs and road gutters	
,, ,,	7.2	,, ,,	5	,, ,,	say concrete floors	
,, ,,	6	,, ,,	6	,, ,,		
,, ,,	$5\frac{1}{7}$	,, ,,	7	,, ,,		
,, ,,	$4\frac{1}{2}$	,, ,,	8	,, ,,		
,, ,,	4	,, ,,	9	,, ,,	say concrete roads or	
,, ,,	$3\frac{3}{5}$	,, ,,	10	,, ,,	concrete walls	
,, ,,	3	,, ,,	12	,, ,,		
,, ,,	$2\frac{2}{5}$	,, ,,	15	,, ,,		
,, ,,	2	,, ,,	18	,, ,,		

Will cover	36	square yards	1	**inch thick** say making cement coat to
	45	,, ,,	$\frac{7}{8}$	inch thick road
	54	,, ,,	$\frac{3}{4}$	inch thick
	62	,, ,,	$\frac{5}{8}$	inch thick, say "floating coat" plaster
	72	,, ,,	$\frac{1}{2}$	inch thick, say top coating bitumen or
	108	,, ,,	$\frac{3}{8}$	inch thick foot paving
	144	,, ,,	$\frac{1}{4}$	inch thick
	288	,, ,,	$\frac{1}{8}$	inch thick "setting" on finishing coat
	576	,, ,,	$\frac{1}{16}$	inch thick, of white lime putty.

The smaller thickness for plasterer's coating, bitumen or surfaces, etc.,

SHRINKAGE.

Shrinkage to be reckoned from 16 to 12 feet for 5 inches thick work and more for greater quantities or thicknesses.

See Roads Sections Shrinkage for Concrete Kerbing, &c.

From the above table the quantities of material in bulk can be gauged for the covering area only, of inches thick, *not allowing for shrinkage.* Earthwork, coatings, or layers of Ashes, Sawdust, etc.

Quantity to Mix for different thickness of concrete floors, walls, foundations.

8 cubic feet of dry loose metal, sand and cement mixed will make about **6 cubic feet** consolidated concrete only.

Materials for Colouring Cement.

Mixing to one bag of cement produces

Yellow Ochre, ½ lb. straw, 1 lb. to bag produces dull green.

Yellow Oxide, 1 lb. added a greenish yellow.

Red Oxide, ½ lb. produces pink slate, 1 lb., dull pink, 2 lb., terracotta

Prussian Blue, ½ lb. produces pale green slate, 1 lb. light blue slate, 2 lb. dark slate.

Lamp black, ½ lb. produces pale slate, 1 lb. dark grey, 2 lb. grey black.

Ultramarine Blue, ½ lb. produces grey, 1 lb. blue grey, 2 lbs. dark blue grey.

The oxides have more permanency, as the acids in cement eat out the colour in time.

"Solpah" is a special red paint for red oxide and cement-finished floors and paths, 2/9 per 2 lb. tin.

WATER.

The Metro. Sydney W. & S. charges for water supplied for building and plastering purposes at one farthing per c. yard on cubical contents of each building or by meter as board may determine.

Water consumed, at 11d. per 1,000 gal., minimum charge, 20/–.

The maximum deposit of £5 for hire of meter on value of water to be used.

The charge for water supplied for plastering each room of residence, 2/6.

The charge for water supplied for mixing concrete, brickwork or masonry, at 1½d. per cubic yard measured on work.

The charge for water for concrete foundations of wooden blocks, stone cubes, or other form of roadway or pavement, 20/– per 1,000, sq. yds. superficial measurement of surface of road.

For gas or oil engines, 5/– per 2 h.p. or under, and 6d. extra per h.p. per 1,000 square yards.

White "Medusa" Portland Cement.

Made from plain white cement or waterproofed.

A standard Portland Cement for white stucco, cement plaster, concrete block facing and terazzo tile, &c., using various mineral oxides for colouring from brick to straw tipts.

Weight comparison per cubic yard: 94 lbs. White Medusa Cement; 40 lbs. White Hydraulic Lime.

Application, first coat of ordinary Portland Cement. Add waterproofing powder or paste, 2 per cent. weight to 2 lbs. per bag; mix slowly in rotating drum. Plaster "one way" with steel trowel; apply **second coat** next day. **Finishing coat** after a week.

Dry slowly and keep sprayed three days. Second coat applied next day on keyed surface to screeds 5 feet apart. Finishing coat after a week, and kept sprayed over scrim for slow drying. If stippled coated, trowel smooth and lightly pat with brush ends. If sand floated effect, rub circular motion, using wood "float," adding sand.

This method applied to other similar wall covering materials.

COVERING POWER OF 1 BAG OF PORTLAND CEMENT.

1 bag of Portland Cement = 120 lbs. = 1.33 primary weight and measurement. 1 ton = 18 bags.

1 bag-full unshaken is 1.41.

Portland Cement	Sand	Mixed = about	cover
	bags	c. feet.	1 inch thick
1	2	= 3.40 =	26 s. ft.
1	3	= 4.50 =	36 s. ft.
1	4	= 5.60 =	47 s. ft.

1 to 4 mixture when used as brick mortar will (with a joist of ⅜in.) lay 144 bricks.

Memorandum

1 cubic foot of loosely filled cement weighs from 87 to 90 lbs.; tightly packed, 110 lbs.

Weight per cubic ft. in Concrete various 1 : 2 : 4 mix

	c. ft.		lbs.
1 ton river sand ...	... 21	Coke breeze ...	60 to 100
1 ton Pit Sand ...	... 22	Clinker	...: 110
1 ton Coarse Gravel ...	... 23	Brick	... 125
1 ton ¾in. Blue Metal	... 24	¾ Bluestone ...	... 144

If reinforced, add weight of metal built in.

1 gallon of water = ·16 cub. ft. = 10 lbs.

1 cubic foot water = 6¼ gal. = 62.4 lbs.

Average quantity of water in a cubic yard of **dry** material, from 18 to 24 gals.

Aluminate Cement is made from limestone and bauxite, the latter material being rich in aluminate is used instead of clay. It is said to set quickly, and to resist the chemical action of sea water and certain underground waters in tunnels.

A mixture of 1 : 2 : 4 bluestone, gravel concrete will give, in 24 hours, a compressive resistance of 3,000 lbs., at three days, 4,000 lbs., and at seven days, 5,000 lbs. per square inch.

It is claimed that in reinforced concrete work, the "forms" used in construction can be removed in four days.

The construction of the great Hume Reservoir on the N.S.W. and Victorian border (3 feet higher than Murray River flood record). Modern methods are now employed in building higher "coffer" dams, where the wall of dam is to intersect hills, so as to divert the river current for about 20 chains to enable the work to be proceeded with.

This is where, in 1860 (66 years ago) the late Chas. Mayes, C.E., (the prime author and compiler of the first wonderful six editions of this *Australian Price Book*) laid out, for a private firm, the railway from Echuca to Moama near the Campaspy River.

There to-day, the caterpillar mounted steam "navvy" with drag-line method of excavator. The conveyor of excavation by belting, &c., and the modern concrete mixers and distributors that all tend for perfection and speed of construction. What a fascinating difference in methods in 66 years.—C. E. Mayes.

REINFORCED CONCRETE.

A few practical points will be of interest to contractors.

Specially written by M. Stanley, Civil Engineer, to whom I am also indebted for calculated concrete tables included in this edition.

Mould Work.—Before commencing a job, it is always advisable to carefully inspect the plans and designs supplied with the object of determining how far the mould work once fabricated can be re-used, as forms for other girders, or floor panels without alteration. Re-adjusting of forms, once they have been in contact with concrete the carpenter-work involved costs money. Wherever possible, the timber should be so fitted so that a minimum number of nails are required. The nails when used should not be driven home, only in exceptional cases. If the head of the nail is left projecting sufficiently to enable a claw hammer to extract it easily, it will save considerable breakage of forms when stripping. This is a very simple, practical point, but it is one of considerable importance, and one that is most often overlooked. Oiling or whitewashing of forms is good practice to prevent concrete or cement clinging.

The cost of Form Work for a job constitutes the heaviest charge in reinforced concrete work, and the cost of concrete in places can be considerably cheapened by careful preliminary consideration of the plans

Salvage of Forms.—The timber should be scrubbed and oiled and placed in racks ready for further use.

The Stripping of timber from Concrete.—Where the above suggestions are carried out, the stripping from the concrete work is considerably simplified.

The concrete is not by any means mature when stripped.

Considerable damage can be done by stripping forms to which preliminary consideration has been neglected and the method often seen of forcing the timber from the concrete work by the use of heavy bars cannot be too strongly condemned. Effort should be made on all occasions to endeavour to arrange the timber form scheme that stripping can be effected without forcing in any way.

Placing of Concrete.—For the small job elaborate concrete placing schemes do not generally pay, and the method in use, viz., the barrowing of concrete from the hoist to its position, is quite satisfactory provided that the concrete has the right consistency. If the concrete is mixed too wet, then difficulty is experienced in emptying the barrows—the heavier particles settle into a hard mass. Where the concrete is mixed with the correct water content, the concrete will leave the barrow easily and without trouble. To watch the placing of concrete by barrows will give anyone very speedily the correct idea as to the right proportion of water for a batch, generally the mixer should be fitted with a water measurer.

Chuting the Concrete.—Where the work is of such dimensions as to make chuting a payable proposition, the placing of concrete by this method is satisfactory provided that care is exercised as to the water content. Where the mixture is too sloppy the concrete will not run through the chute. In cases where the mix of concrete is correct so far as the water is concerned the concrete will flow along fairly flat slopes with no difficulty whatever.

In Regard to Mixing.—Excellent Australian mixers are at present on the market which give results equal to the best imported (*see advts.*) and tprovided that the proportioning of the materials is correct, the only point in connection with mixing is to keep the batch in the mixer long enough to produce an adequate mix. One reads in the papers of mixers turning out a great number of cubic yards of concrete per day, but the engineer is not in the least degree impressed by these test records. It is far better to over mix than to under mix, and the advantage of machine mixing is its thoroughness and that the human labor equation is eliminated.

Many modern specifications in regard to the mixing of concrete definitely indicate the number of revolutions per minute of the mixer and also the length of time which the batch is to be turned in the drum

Proportions.—The general specification for work usually fixes this in terms of, say, for example, 4 : 2 : 1, viz., four parts by volume of a certain size metal; two parts by volume of a certain sand; one part by volume of cement.

This may or may not produce dense compact concrete. The intention in proportioning is to introduce just so much sand and cement as will fill the interstices in the metal and innumerable experiments have been tried in many parts of the world to determine the methods which should be adopted to produce a dense mix. One method is given elsewhere in this book (*see p.* 148). The sand and cement act as a mortar to bind together the various pieces of metal. The tendency however is to use far too much sand in general construction work and if possible this should be avoided.

Proportions of Mix.—To determine in general the quantities of sand, stone and cement which are to go into a job to conform to a specification it is generally accepted that 42 cubic feet of material are required to produce 27 cubic feet or 1 cubic yard of concrete, and of this 42 cubic feet if four parts of it is to consist of metal, two parts of sand and one part of cement, a 4 : 2 : 1 mix. This actually means that in a cubic yard of 42 concrete we have 24 cubic feet of stone, 12 feet of sand and 6 feet of cement, making 42 cubic feet of material.

If the specification is a 5 : 3 : 1 then assuming that 42 cubic feet go to cubic yard of concrete the quantity of metal is 23.3 cubic feet, 14 cubic feet sand and 4.7 cubic feet cement. Again the quantities of material actually going into the mixer is 42 cubic feet. This gives a fairly accurate method for determining the quantities of material necessary for tendering purposes.

Placing of Steel Reinforcement.—The determining of steel shapes for slabs and girders is a comparatively simple matter but where the concrete is a portion of the wider scheme, i.e., columns, girders, floors, etc., the shape of the steel rods throughout the work varies considerably and it is generally conceded to be the work of a specially trained man. This branch is usually outside the sphere of the contractor, but the placing the steel in its position calls for considerable skill, for after all, the work of the designer can be negatived entirely by incorrect placing and the contractor is wise who before placing the concrete over any steel system insists on a capable engineer or architectural inspection.

The designer of reinforced concrete work and the contractor should act in close collaboration for once the concrete is poured, it is impossible to see what precisely is the position of the steel rods.

In general, the steel system should be rigidly tied to prevent displacement. Each road has a particular function to perform, and it can only perform its work when it occupies the position dictated by the design and to hold it in that position should be the object of all the work in concrete.

Generally, the cover for the steel rods varies depending on the thickness of the slab and may be as small as ½ inch.

Breaking Points in Concrete Work.—The positions where cessation of pouring may occur should be definitely shown on the plan. In general, these working joints should have a **vertical face** and be located **across the centre of girder** and slab spans. This is the best and most efficient position. It is thought by many that where the working joint is made in a girder the concrete may be permitted to take its natural slope to produce "scarf" joint. This is quite incorrect and is not consistent with good concrete practice.

General Cost of Cubic Yard.

Based on a 4 : 2 : 1 mixture.

Cost of cement, 4½ bags at 7/– per bag = 31/6.

Cost of stone, 9 cubic yards at 12/– per ton = 15/–.

Cost of sand, 45 cubic yards at 6/– = 4/–.

Add—

Cost of steel reinforcement, 20/– to 30/– per cubic yard.

Labor, at 2/6 per hour, mixing and placing, 6/– to 10/–, according to length and height.

Labor cost on forms per square yard, 2/6 plain surfaces, to 5/– for beams and columns.

Labor, cost stripping, 6d. to 1/6 per square yard.

Cost of rubbing down (labor and material), 9d. to 1/3 per square yard.

Labor, placing steel, £2 per ton, to £4 per ton.

Strength at different ages of drying, of cement after setting, approximately, 1 months, 60 per cent. of its strength 2 months, 75 per cent., 3 months, 85 per cent., 4 months, 90 per cent., 6 months, 95 per cent.; strength at 12 months, 100 per cent.

4. Also the timber used for form work is practically uninjured.

Concrete for small jobs is more cheaply handled by batch maker machine of 4 cubic feet capacity to skip 4 cubic feet, friction hoist machine, raised and emptied into 2 wheeled iron barrows of 4 cubic feet, and wheeled to points required.

By hoists and chutes, large quantities of concrete in a semi-liquid state can be laid for about 4/– to 8/– per cubic yard.

CENTERING FOR CONCRETE.

All centering must be true and rigid and properly braced. All joints must be fairly tight, so as to prevent leakage of the liquid mass. Waterproofing with asphalt papers or paint can be done very quickly.

The design of centering for floors between beams should be so arranged that the slab form may be removed first, and then the sides of the beams, leaving the beams or girders supported for a long time.

Bevelled strips are used to finish column and beam corners, and "fox," or bevelled wedges between uprights support and ribs or bearers, to raise boards gradually to height desired, and loosen them when concrete has set sufficiently.

Where a watertight concrete is desired, mix in the first layer soft soap and alum, in the proportion of 2 lbs. soft soap and 12lbs. alum, with 30 gallons of water per c. yd. of concrete. *See also* Index for damp-proof.

Framing for concrete walls, where practicable, should be secured by long bolts through the wall till set. The holes made by bolts to be filled in afterwards.

Dimnsieon of Bottomless Boxes.

MALCOM S. STANLEY, A.M.I.E.A.

Capacity (Cubic Feet) Inside Dimensions.

			inches long
1	cub. ft.	=12 x 12	x 12
1¼	,,	=12 x 12	x 15
1½	,,	=12 x 12	x 18
1¾	,,	=12 x 12 x	21
		ft. ft.	inches
2	cub. ft.	= 2 x 1	x 12
2¼	,,	= 2 x 1	x 13½
2½	,,	= 2 x 1	x 15
2¾	,,	= 2 x 1	x 16½
3	,,	= 2 x 1	x 18
3¼	,,	= 2 x 1.6	x 13
3½	,,	= 2 x 1.6	x 14
3¾	,,	= 2 x 1.6	x 15
4	,,	= 2 x 1.6	x 16

		inches
1	cub. ft.	=12 x 12 x 12
1¼	,,	=15 x 15 x 9⅜
1½	,,	=15 x 15 x 11½
1¾	,,	=15 x 15 x 13½
2	cubic ft.	=18 x 18 x 10⅝
2¼	,,	=18 x 18 x 12
2½	,,	=18 x 18 x 13⅜
2¾	,,	=18 x 18 x 14⅝
3	,,	=18 x 18 x 16
3¼	,,	=18 x 18 x 17 5/16
3½	,,	=21 x 21 x 13½
3¾	,,	=21 x 21 x 14 11/16
4	,,	=21 x 21 x 15 11/16

1	cub. ft.	=12 x 12 x 12
1¼	,,	=13 7/16 x 13 7/16 x 12
1½	,,	=14⅝ x 14⅝ x 12
1¾	,,	=15 13/16 x 15 13/16
2	,,	=16 16/16 x 16 16/16 x 12
2¼	,,	=18 x 18 x 12
2½	,,	=18¾ x 18¾ x 12
2¾	,,	=19 9/16 x 19 9/16
3	,,	=20¾ x 20¾ x 12
3¼	,,	=21⅝ x 21⅝ x 12
3½	,,	=22 7/16 x 22 7/16 x 12
3¾	,,	=23 3/16 x 23 3/16 12
4	,,	=24 x 24 x 12

WORKABLE SIZES FOR CONCRETE GAUGING FRAMES.

4ft. 6in. x 3ft. x 2ft. = 27 c. ft. or 1 yard.

3ft. x 3ft. x 1ft. 6in. = 13½ c. ft. or ½ yard.

3ft. x 3ft. x 9in. = 6¾ c. ft. or ¼ yard.

	c. ft.
Capacity of wooden barrow, 1/10 cub. yds.	2.7
Average load of broken stone for wheel barrow	2.4
Sand for same wheel barrow	2.5
Large load of metal for iron wheel barrow	3.0
Large load of Sand for iron wheel barrow	3.5
Average load of Metal Concrete	1.9
Large load of Metal Concrete	2.2

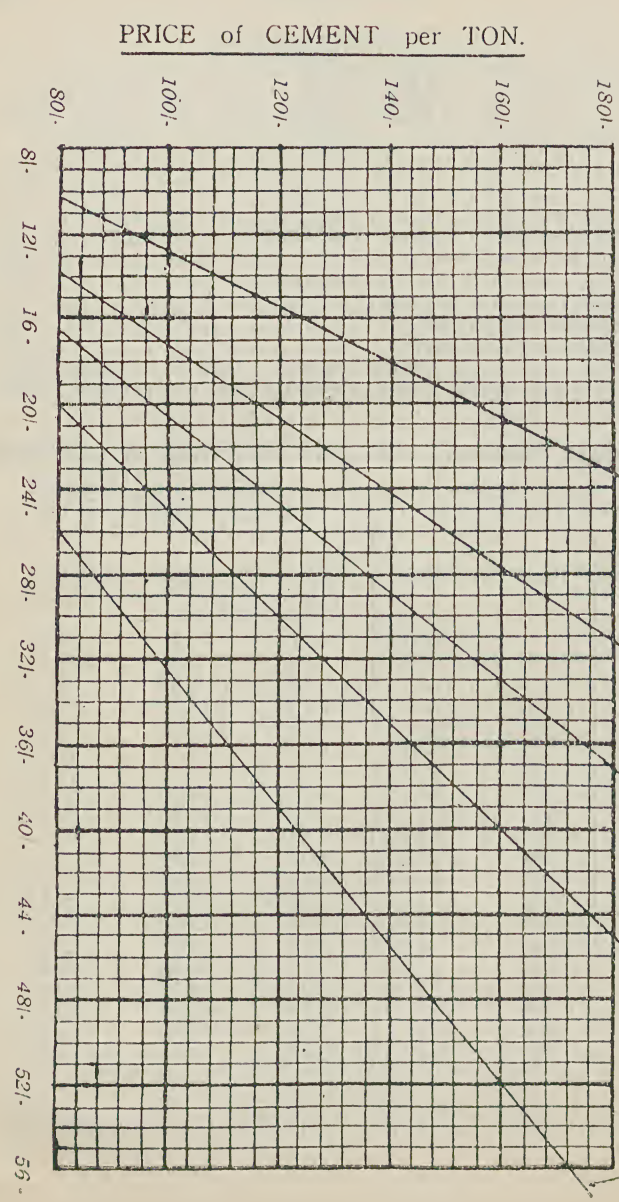
Average time of man filling concrete, 4 barrows = 30 minutes.

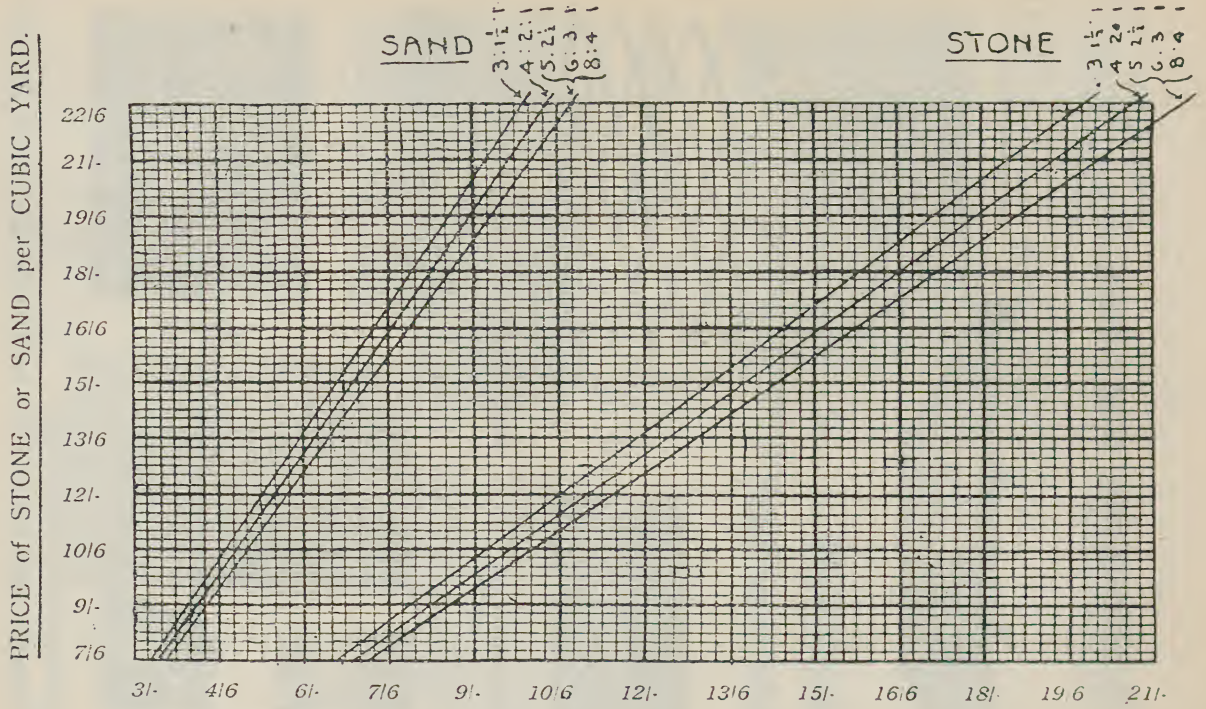
1 cub. yard concrete mixed, wheeled 50 feet and rammed, 1 man, 4½ hours.

MATERIALS REQUIRED FOR ONE CUBIC YARD OF CONCRETE

Concrete Mixture Parts			Material for one cub. yd.		
Cement	Sand	Stone	Quantity Cement bags	Sand cubic feet	Stone cubic feet
1	1	2.0	7.71	10.5	21.06
1	1	2.5	6.88	9.45	23.63
1	1	3.0	6.18	8.37	25.38
1	1.5	2.5	6.18	12.69	21.06
1	1.5	3.0	5.55	11.34	22.68
1	1.5	3.5	5.16	10.5	24.57
1	1.5	4.0	4.71	9.72	25.92
1	2.0	3.0	5.10	14.04	20.79
1	2.0	3.5	4.71	12.96	22.41
1	2.0	4.0	4.38	11.88	23.76
1	2.0	4.5	4.08	11.34	25.11
1	2.5	4.0	4.08	14.04	22.14
1	2.5	4.5	3.81	12.96	23.63
1	2.5	5.0	3.57	12.42	24.57
1	2.5	5.5	3.39	11.61	25.38
1	3.0	4.5	3.57	14.58	21.87
1	3.0	5.0	3.39	13.77	22.95
1	3.0	5.5	3.18	12.96	23.76
1	3.0	6.0	3.00	12.42	24.84
1	3.0	6.5	2.88	11.88	25.65

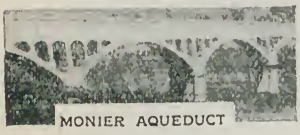
NOTE.—One bag of Cement contains 1.34 cubic feet.
One Kerosene Tin contains .65 cubic feet or one half bushel.


PRICE of CEMENT per TON.
80/-
100/-
120/-
140/-
160/-
180/-
8/-
12/-
16/-
20/-
24/-
28/-
32/-
36/-
40/-
44/-
48/-
52/-
56/-
8:4:1
6:3:1
5:2½:1
4:2:1
3:1½:1
COST OF CEMENT PER CUBIC YARD OF CONCRETE.


SAND
STONE
3:1½:1
4:2:1
5:2½:1
6:3:1
8:4:1
PRICE of STONE or SAND per CUBIC YARD.
22/6
21/-
19/6
18/-
16/6
15/-
13/6
12/-
10/6
9/-
7/6
3/-
4/6
6/-
7/6
9/-
10/6
12/-
13/6
15/-
16/6
18/-
19/6
21/-
COST OF STONE OR SAND PER CUBIC YARD OF CONCRETE.

SYSTEMS OF REINFORCEMENTS & THEIR ADAPTATION

BARS IN POSITION.



MONIER AQUEDUCT

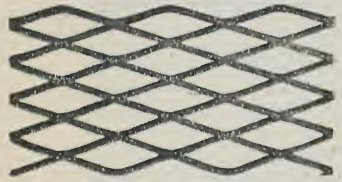
1

MONIER LIGHT-HOUSE.
Bradley's Head. Sydney Harbour. N.S.W

MONIER WALLING.

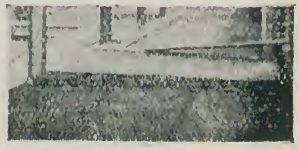
MONIER PILES.

Concrete - Steel **Monier** **Manufactures**



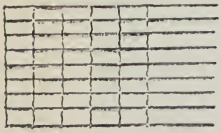
Section through Intersections.

2

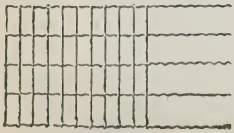


British Expanded Steel

Tension Wires Along the Roll



Tension Wires Across the Roll.



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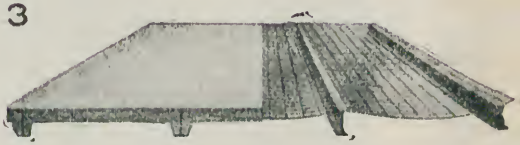
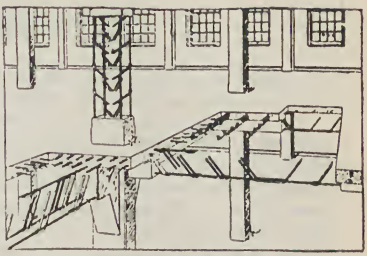


JOHNSON'S STEEL-WIRE CONCRETE LATTICE.

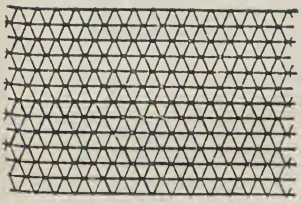
KAHN RIBBED BARS

4

KAHN TRUSSED BAR



Perspective of general adaptation.



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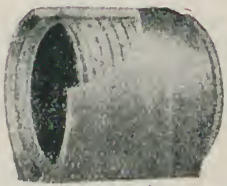
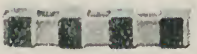


Reinforced Concrete Sewer Pipe

Triangle Mesh Reinforcement

Triangle Mesh Concrete Reinforcement.



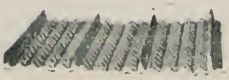
Square Bar.

6

The Round Bar.

Round Bar

INDENTED BAR



HY-RIB

7

H.V. RIB.

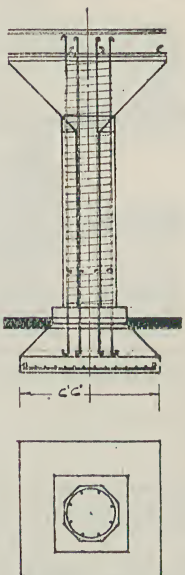
REINFORCED CONCRETE.

Reinforced Concrete is now the main factor in all braches of Modern Building construction

For **twisted surfaces, suspended stairways, groined arches, domed roofs,** and many other forms of construction where lightness and strength are required; also dams, viaducts, aqueducts, bridges, septic tanks, tanks, sewer pipes, lighthouse construction, piles, telegraph poles, railway sleepers, kerbs and gutters, silos.

The two materials, Portland cement, and concrete and steel, co-operate harmoniously together, and produce a combined material stronger in tension, compression and shear strain far superior to those of its component parts. The concrete protects the steel form corrosion and the steel strengthens the mass.

Many different systems of reinforcement are used, some simple and easily operated by the general contractor, and others requiring the expert manipulation of the specialist and the placing of one type or other of the several deformed bars manufactured for the purpose.



Reinforcement for Column in Basement.

SYSTEMS OF REINFORCEMENTS DESCRIBED.

A short description of the principal systems of reinforcing concrete, together with prices, so far as I have been able to obtain them by the courtesy of those interested, are appended :—

"**The Concrete Steel**" or "**Monier**" **System** (*Fig.* 1). It consists of steel bars placed at given distances apart and crossed at right angles with other bars wired at the intersections. It requires, however, expert designing and manipulation, consequently, detailed prices for general work cannot be given, but a list of special manufacturers with prices affixed will be found on the following pages.

Expanded Steel (*Fig.* 2) is made in several sizes of mesh and thicknesses of sheets, and is adopted for a great variety of purposes; but for the reinforcement of concrete, the 3in. mesh, of suitable size strands for the strength required is generally used in floors, staircases and circular forms such as winding stairs, silos, sewer pipes, etc., manufactured in sheets from 8ft. to 16ft. long by 4ft. to 8ft. wide.

Johnson's Steel Wire Lattice (*Fig.* 3) is a mesh reinforcement formed of longitudinal wires crossed at right angles with smaller bonding wires, special provision being made for strength by the weaving of

the straight tension wires along or across the roll as required. Prices per square yard according to gauge and mesh per list following.

Clinton Wire Mesh is a somewhat similar material, with the wires electrically welded at the intersections to preserve rigidity.

The Kahn Trussed Bar (*Fig.* 4) is made of a special grade of medium open hearth steel, and is manufactured in England by the Trussed Concrete Steel Co. Ltd. The cross section has two horizontal flanges or wings projecting at opposite sides. These flanges or wings are sheared up at intervals to form the rigidly connected diagonals, making a unit of main bar and shear members.

Kahn Ribbed Bars are rolled from ⅜in. upward varying by ⅛in., and have the same weight and sectional area as a square bar of the same designation.

Kahn Ribbed Bar, price per cwt. **from 24/–.**

(*See agents advt. page* 6.)

Triangular Wire Mesh (*Fig.* 5) is another reinforcing material of the same class, the spacing wires being twisted round the longitudinal or tension wires in a diagonal direction to secure its desired form. Made in rolls up to 300ft. long in different widths and gauges. *See advt., p.* 6.

The Indented Bar System (*Fig.* 6).—This is a bar rolled with indents along the length for the purpose of securing mechanical bond.

The solid cross section of the steel bar is not decreased by indents.

Price **from 20/6** per cwt. small quantities.

But for complicated work special designs of arrangement of bars by expert engineers employed, together with quotations for quantities, fixed complete, will be made on application to Agents. (*See page advt.* 7.)

Chain Wire Netting Reinforcement, –/4 to –/8 per s. foot (*see* prices Wire Worker and *advt.* page 11) ; L and T iron or ordinary bar iron, 20/– to 25/– per cwt. (*See* Ironworker).

Hy-Ribs (*Fig.* 7) metal lathing stiffened by rigid *high ribs* manufactured by the Trussed Concrete Steel Co., Ltd. The ribs and lath are made from a single sheet of steel, forming a combined unit of lath and studs. As the ribs give strength and rigidity to the material, very little centering is required. It can be curved for floors and roofs, but is used mostly for external walls, partitions, &c., and lasts longest if completely covered well both sides and protected from the air and water. Made in sheets 8ft. 10in. x 12ft. long ; also 3 gauges, 28, 26 and 24.

Price respectively, **3/–, 3/3, and 4/3** per s. yard. (*See advt. page* 6.)

MONIER.

CONCRETE STEEL MANUFACTURE.

N.S.W. State Monier, Pipe and Reinforced Concrete Works, 85 Pitt Street, Sydney.

Monier Pile Armour (Fig. 1) protects timber piles driven in tidal waters from the ravages of the Teredo Navalis and other marine borers.

Full section Pile Armour, type A, with bandage joint and collar joint, are employed in new structures, where they can be slipped over the pile after the operation of driving, while the half section, type B., is employed for the encasing of the piles of existing structures where the former method of armouring is inapplicable.

Armour, type A, with bandage joint, is principally used in bridge piers, and with collar, joined with a bituminous composition, is used in constructions subject to shocks.

MONIER PILE ARMOUR.

Method of Jointing	3ft. 7in. long Diameter	Price per length of 3ft. 7in.	Approximate Weight	Weights by Boat cubic tonnage
Type	ft. ins.	£ s. d.	cwt. qrs. lbs.	cubic tons
A	1 6	1 0 6	2 1 0	0.23
Bandage	1 9	1 7 3	2 3 14	0.30
Joint	2 0	1 14 0	3 2 14	0.38
A	1 6	1 5 0	2 3 0	0.27
Collar	1 9	1 13 0	3 1 21	0.36
Joint	2 0	2 1 6	4 1 7	0.45
B	1 9	1 18 6	5 2 0	0.34
Steel Locking Bar Joint	2 0	2 5 0	6 2 22	0.42

MONIER TIDAL FLAPS 3ft. 6in. long.

Inside Diameter		Price per Pipe with flap and accessories	Approx. weight of pipe, flap and accessories		
ft.	ins.	£ s. d.	cwt.	qrs.	lbs.
1	6	9 3 6	3	3	7
1	9	9 17 0	4	3	18
2	0	10 11 0	6	0	0
2	6	12 1 0	8	1	21
3	0	13 17 6	10	2	14
3	6	15 16 6	13	2	7
4	0	17 16 0	16	2	14
4	6	19 12 0	20	0	7

EXPANDED STEEL REINFORCEMENT.

(*Fig* 2.)

For Concrete Floors and Footings.

The present prices of the usual grades stocked in Sydney and Melbourne are as under. *See agent's advertisement, page* 6.

For Floors, about 5 per cent., and for Foundations about 12½ per cent. must be allowed extra for laps of sheets.

When introducing this diamond mesh reinforcement into floors, roads, silos, etc., the following strands are generally used, being based on the proportion of metal to thickness of concrete : at least ½ per cent. metal to concrete.

SECTIONS USUALLY STOCKED.

List Ref. No.	Size of Mesh	Dimensions of Strands	Approx. Weight per yd. sup	Area in 1 foot Width	Price. s. d.
10	3in.	¼ x 3/16	11½lbs.	.375	4 6
61	3in.	5/16 x ⅛	9½ ,,	.3125	4 3
8	3in.	¼ x ⅛	7½ ,,	.25	4 0
9	3in.	3/16 x ⅛	5¾ ,,	.1875	3 9
15	3in.	⅛ x ⅛	3¾ ,,	.125	2 9

Stock sheets from 16ft. x 6ft. to 8ft. x 4ft. per yard super. For smaller Meshes and Strands, *see* Plasterer.

EXPANDED STEEL DIAMOND MESH.

Labor.—Fixing sheets in position, per sq. yard. 5d. to 8d.
Centering for concrete, per sq. yard 3/– to 5/–

All junctions of sheets in foundation must lap one full mesh (8in.), long way of mesh, and 3in., short way of metal, and at intersecting walls must cross completely. The metal should be laid about 2in. from bottom of concrete, thoroughly embedded, and the concrete well rammed or trodden down.

ROUND RIB BAR REINFORCEMENT.

Areas and Weights of Bars.

Diam. inches	Area Section Approx.	Weights per foot length	Diam. inches	Area Section Section	Weights per foot length
¼	.049	.167	¾	.441	1.50
⅜	.110	.376	⅞	.601	2.04
½	.196	.668	1	.785	2.67
⅝	.037	1.04	1⅛	.994	3.38
			1¼		4.2

Stock lengths from 20/– per cwt. Cut to lengths, 22/6. Cut and bent to any shape, for beams, stirrups, spirals, hoops, etc., 24/–.

Labor, bar reinforcement fixing, from £3 10s. per ton or 3/6 per cwt., according to design or method.

JOHNSON'S WIRE LATTICE REINFORCEMENT.

Johnson's Wire Lattice (Fig. 3) for floors, foundations, roads, wall footings, silos, tanks and concrete buildings of every description is manufactured in rolls or panels to specification (not wider than 7ft. 6in.) with special tensile and binding wires woven to form a triangular mesh. The tension wires are straight and the cross wires crimped. Tension wires can be woven in to any length or width of roll or panel as required.

WIDTHS OF 3 FEET AND OVER.

No.	Mesh	Gauge	Weights per Sq. Yard.	Price per Sq. Yard.
7	1½ x 3	13 x 13	2¾ lbs.	3/-
8	1½ x 3	11 x 11	4 ,,	3/8
9	1½ x 3	10 x 11	4¾ ,,	4/-
10	2 x 4	11 x 11	3 ,,	2/11
11	2 x 4	10 x 11	3½ ,,	3/2
12	1½ x 3	7 x 11	7¾ ,,	5/1
13	2 x 4	7 x 11	6¾ ,,	4/5
14	2 x 4	6 x 11	7 ,,	4/7
15	1½ x 3	6 x 11	8⅞ ,,	5/6
16	2 x 4	Twin 7 x 11	9¼ ,,	7/4

If Tension Wires short way of Lattice, 5 per cent. extra.

JOHNSON'S SPECIAL STEEL WIRE LATTICE FOR ROAD CONSTRUCTION, Etc.

	Gauge.	per sq. yd.
3in. x 16in. mesh = 6 x Twin 11 G.W.		1/11
3in. x 16in. mesh = 7 x Twin 11 G.W.		1/10
3in. x 12in. mesh = 7 x Twin 11 G.W.		2/2
3in. x 8in. mesh = 7 x Twin 11 G.W.		2/5

TO CARRY A SAFE WORKING LOAD.

Use No. of Lattice	Thickness of Concrete	1½ cwt. Centre of Support	3 cwt. Centre of support
No. 16	7½ inches	15 feet	11 feet
No. 16	7 ,,	14 ,,	10 ,,
No. 12	6½ ,,	13 ,,	9 ,,
No. 12	6 ,,	12 ,,	8 ,,
No. 14	5 ,,	10 ,,	7 ,,
No. 14	4½ ,,	9 ,,	6 ,,
No. 8	4 ,,	8 ,,	5 ,,
No. 7	3 ,,	6 ,,	4 ,,

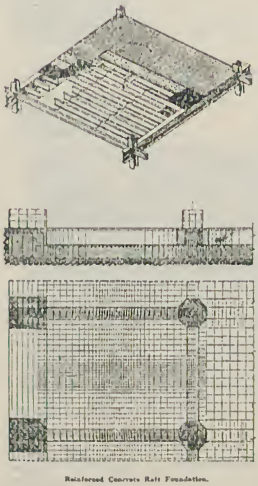
By fixing stabilizing hooped and cross ties in columns to vertical, and the introduction of grouped stirrups to horizontal bars for beams, bars has made a great improvement in reinforced concrete construction.

The B.R.C. welded joint lattice is a similar fabric, made in rolls. Prices, 1/4 to 9/7 per square yard according to size and quantity.

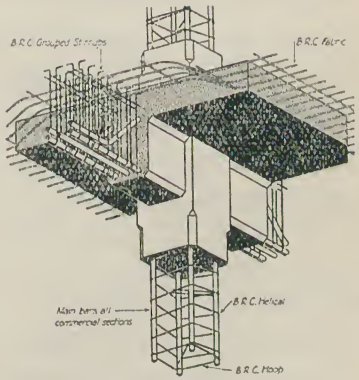
Used for ground floors, foundations and extensively for municipal roads.

DIMENSIONS OF STANDARD ROLLS.

Ref. No.	Size of Mesh (ins.)	Gauge of Wire Imp. Stand.	DIMENSIONS OF ROLLS			
			Width (ins.)	Length (ft.)	Contents (sq. ft.)	Weight (lbs.)
610	6 x 6	10 (.128in. diam.)	87	240	1740	309
1210	12 x 12	10 (.128in. diam.)	87	240	1740	160



Reinforced Concrete Raft for Foundation.



See advt., p. 11.

KAHN BARS.

Kahn Trussed Bars (*Fig.* 4).

Nos. ...	1	2	3	4
Inches ...	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{3}{4}$
Price, per ft. run ...	5d.	9d.	1/6	2/–

Kahn Ribbed Bars.

Sizes—inches ...	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Weight per ft. lbs.	.48	.86	1.35	1.95	.265	3.45
Sectional areas, sq. in.	.1406	.250	.391	.562	.766	1.00

Prices, per cwt., from 23/–. *See agent's advt.*, p. 6.

TRIANGLE MESH.

Triangle Mesh Re-inforcement (*Fig.* 5).—In rolls up to 300 feet long In widths of 26in., 42in., and 58in.

Longitudinals Spaced 4 inch Centres, Cross Wires Spaced 4 inch. Centres. Number and Gauge of Wires, and Weights per 100 Square feet.

Style Numbers	No. of Wires Each	Long	Guage of Wires Each	Long	Gauge of Cross Wires	Approx. Weight pr 100 s. ft.	Per Square yard.
						lbs.	s. d.
28	1		10		$12\frac{1}{2}$	34	1 9
23	1		$\frac{1}{4}$		$12\frac{1}{2}$	72	3 6
32	2		5		$12\frac{1}{2}$	92	4 3

CONCRETE REINFORCEMENTS.

"Armco."

Self-centering, 10ft. x 29in., 6/– per sq. yd.

Trussit, 10ft. x 19in., 6/– per sq. yd.

Diamond Rib Lathing, 8ft. x 24in., 3/9 per sq. yd.

Herringbone Lathing, 8ft. x 20¼in., 3/– per sq. yd.

Key Lathing, 8ft. x 24in., 2/9 per sq. yd.

Cold Rolled Channels, ¾in. x 20ft., 2d. per lin. ft.; 1in. x 20ft., 2½d. per lin. foot.

Cold Rolled Slotted, 1½in. x 20ft., 4d. per lin. ft.; 2in. x 20ft., 6d. per lin. ft.

Corner Bead—Galv., 10ft. lengths, 3d. per lin. ft.

Expanded Metal Angle, 8ft. lengths, 3d. per lin. ft.

See advt., pp. 6, 38.

Water required in mixing a cubic yard of cement and sandstone concrete is from 30 to 35 gallons, bluestone metal from 25 to 30 gallons.

Mem.—Whenever difficult forms present themselves in buildings, such as entrances with semi-circular arches, circular on plan, or with convex jambs, &c., it will be found that cement rammed concrete, including mould planking, is from one-half to one-third the cost of brickwork in cement.

To prevent cement or concrete from sticking to the moulds, **common soap** dissolved into a thin jelly and applied with a brush to wooden or metal inner faces of "forms" or moulding devices. It can be readily hosed off at completion, leaving the cement face clean to receive finishing coat if required. Oil is unsuitable as it impedes perfect bond at joints and suction required on face to fix a second coat of cement.

Thick lime wash is also found a suitable prevention from sticking for moulds where it does not matter in appearance.

CONCRETE FENCE POSTS.

6ft. 6in. long, tapered 6in. to 4in. x 4in. thick, re-inforced with No. 9 crimped wire. Lay mould solid and tamp concrete inch by inch around wires.

One cubic yard coke concrete at 80/- (depends on the mix) would make 27 posts. Cost per post, about 3/-.

INNES-BELL CONSTRUCTION.

Extract from "Building," 1926.

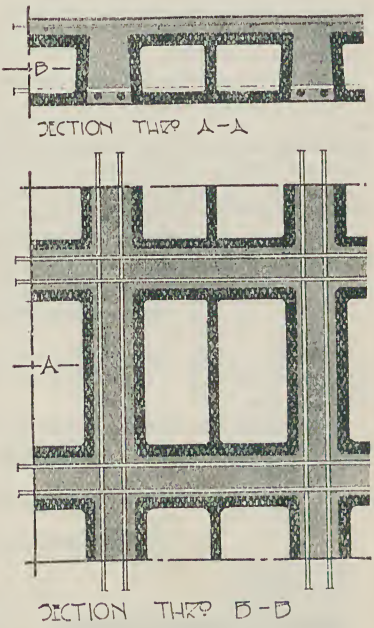
During the past few years considerable thought has been given to concrete floors.

In any structure frequently the major objective has been its elimination of columns and the use of wider spans.

Wider spans demand larger girders and large girders reduce **head room.**

Thus in increasing the distance between columns the designer is compelled to reduce head room. In general, his work lies in effecting a compromise between the column centre and girders dimensions. This problem is most keenly felt in **garages.** Again with girder and slab "Way-outs," considerable work is entailed to produce a thoroughly economical job, and the designer has frequently to "lay-out" a floor in two or three ways to get the best result.

The solution of many garage problems lies with the Innes-Bell method which interlaces on a thoroughly scientific fashion. The use of hollow blocks and reinforced concrete by which huge girderless spans are easily obtained, heavy girders are eliminated and the *dead weight* of floors, i.e., concrete and steel, is reduced to a minimum. Sydney has a number of these floors, consisting of columns with 33ft. 6in. centres each way, and tests conducted by the Sydney city authorities gave results under load which were satisfactory. Girderless floors are far more economical in cost than girder floors, and tests indicate that the girderless floors are just as stable.



The Black and White Taxi Building and the brick garage, Darlinghurst, are pleasing examples of the Innes-Bell construction.

The Innes-Bell Hollow Block produces a cellular floor, in which all that **useless concrete** in the lower face of the floor is removed and just as the ordinary R.S.J. is **cored** to reduce weight with no corresponding reduction in strength, so the reinforced concrete floor is **cored** to reduce its dead weight. The dead weight of solid reinforced concrete floors, even in a medium structure is enormous, and the casing of same correspondingly heavier column and posting are necessary. *M. S. Stanley, A.M.I.E.A., is the Consulting Engineer for the above company.*

See advt., p. 11.

The sizes for the Innes-Bell Hollow Blocks are :—

5in. deep x 24in. x 24in.
7in. deep x 24in. x 24in.
10in. deep x 24in. x 24in.
12in. deep x 24in. x 24in.
14in. deep x 24in. x 24in.

Prices vary from 4/– to 6/6 per block.

This form of construction has advantages such as:

1. Reduced quantities of concrete and steel required to span floors over 12ft. span.
2. The simplicity of form work required.
3. The absence of girders and the great spans which are possible (spans exist in Sydney up to 35ft.).

To ascertain Proportion of Voids in Concrete Aggregates.

The components of concrete consist of coarse aggregate, such as gravel or broken stone, brick, clinker, &c., in pieces of varying sizes, the largest of which is determined according to the purpose of the concrete. All such aggregates, however closely packed, will contain innumerable void spaces, which will total a considerable percentage of the volume. These voids have to be filled with grit or sand to make a dense product and to obtain the full value of the cement.

Although the proportion of sand to coarse aggregate is usually specified, it may often be of importance to ascertain the approximately correct proportions needed, and the following method will be found easily applicable :—

Take an ordinary iron bucket, ascertain its exact weight empty, (call this W), fill it with water and weigh (call this W2). Then W2—W will be the capacity of the bucket as measured in water. Empty the bucket and fill it with the stone or sand to be tested for the percentage if voids, screed off evenly at top and weigh (call this W3), then pour in as much water as the bucket will take, then weigh and call it W4. W3 deducted from W4 will indicate the amount of voids in the stone or sand.

To Ascertain the Percentage.

$$\frac{(W4-W3) \times 100}{W2-W} = \frac{\text{space of voids} \times 100}{\text{total capacity}} = \text{per cent. voids.}$$

As stone will absorb water it must be fully saturated before using for above test.

ESTIMATED AVERAGE VOIDS IN A CUBIC YARD.

Or 27 cubic feet of broken metal, different kinds and gauges.

One cube yard	Gauge	c. ft. Voids.
Blue metal	2½in.	contains 10
Blue metal or clean sandstone ...	1½in.	,, 11⅓
Broken bricks, mixed	3in. to 1 in.	,, 13½
River shingle	3in. ,, ¾in.	,, 12
Screened sandstone	2in. ,, 1¼in.	,, 9

Proportion of dry material required to make 1 cubic foot of well rammed concrete in position.

	4 to 1 mix. c. ft.	6 to 1 mix. c. ft.	8 to 1 mix. c. ft.
Stone	0.80	0.85	0.85
Sand	0.40	0.58	0.58
Cement	0.25	0.182	0.137

Stone or rich lime concrete shrinks from 20 to 23 per cent.

Cement concrete from 23 to 27 per cent. compared with the loose dry materials used, or the deduction in material thickness when compressed into place can be made on Table of Cubic Yard Covering Power.

Example of Cost, No. 1—Hand Labor in mixing and casting concrete.

Arrangement of 6 men, viz., 4 shovel men, sprinkler, 1 ganger or trimmer.

Award wages—mixers, 2/1; packer, 2/1½; first grade men, 2/3; ganger in charge of 12 men, 2/6 per hour.

As the men work 8¾ hours per day the wages for above 6 men = 111/3 net labor only, per working day.

Average day's work of above gang, 20 c. yds.

Labor only, per cubic yard, 5/6.

	Per c. yd. s. d.
The **net cost,** mixing and casting only, for 20 yards of broken brick or sandstone concrete, labor per c. yd.	5 6
The heavier bluestone metal is slower—15 c. yds. per day	7 6
Coke concrete being much lighter—25 c. yds. per day ...	4 3

Add for material plant, profit, &c.

Cement floating on rough surface of concrete.

And trowelling to a fair face in cement 1 to 2.

Material—One bushel of cement and two bushels of sand will cover 5 yds. ¾in. thick.

Labor—One man will float and finish 18 square yards per day, or about **two** yards per hour ¾in. thick. *See* Plasterer.

CEMENT MIXTURE.

Body of floating coat usuall 2½ to 1 cement.

Finishing work coat usually 2 to 1 cement.

Facing only coat usually 1 to 1 cement.

LABOR ONLY—Concrete.	Per c. yd. s. d.
Labor in gauging, mixing, wheeling, filling and ramming cement, screenings and metal concrete ..... 6/– to	7 6
Forming or casing, per sq. yd. ... ... 9/– to	12 0
Plank runs and staging, add extra per sq. yd.... 2/– to	64

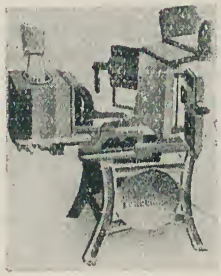
Example, No. 2—Day's work for one man—Bluestone Concrete Floors, 6in. thick.

One man can mix, wheel 20 yds., spread concrete about 5 sq. yds., 6in. thick, in 8¾ hours.

	s. d.
Net cost of **labor** under favourable circumstances 20/– = ...	4 0
Add **material,** bluestone, viz., one-sixth of c. yd. = (as per example, bluestone, preceding page), at £2/3/– = ...	7 2
Net cost per s. yd.	9 5

Concrete block buildings can be reinforced very simply by inserting a few bars of iron or patent brick bonding.

Porch columns, concrete window caps, sills, steps, copings with different coloured quoins, arches and facings can be built as required with reinforcing rods.



"London" Concrete Building Block Machine.

16 inch Block Machine, £52.
With equipment, £80.
24 inch Block Machine, £100.

With vertical acting core, face of the block in bottom of machine mould, thus admitting of coarser concrete at back portion of block.

The system of *facing* with a mixture of 2 to 1 cement and finishing with a coarser material gives the block a finished surface where required, also waterproofing same to some degree.

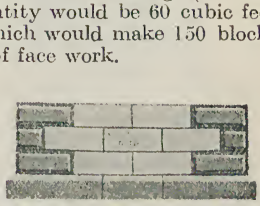
CONCRETE BUILDING BLOCKS.

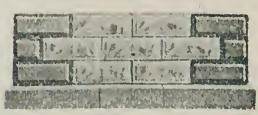
These can be made of coke or breeze siftings, or cinders as a body material to lighten the compressed mass in a 10 to 1 mix.

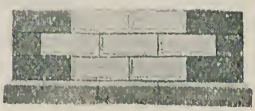
Example—	s.	d.
50 c. ft. = 2 loads of cinders at 7/-	14	0
20 c. ft. = 1 load of sand at 7/-	7	0
7 c. ft. = 2 casks of cement at 22/6	45	0
80 c. ft.	66	0

80 cubic feet when compressed in moulds, the shrinkage (*see table covering power of concrete*) 4 to 3, the quantity would be 60 cubic feet solid, deducting **hollow cores** one third, which would make 150 blocks 8in. x 8in. x 16 inches long = 120 sq. ft. of face work.

(If all solid, the above material would make only 100 solid blocks of the above size.)







It would take 8 hours for two men mixing and casting 150 blocks.

	s.	d.
Labor, 16 hours at 2/6...	40	0
Add **Material** to above ...	66	0
	106	0
Add for power, wear and tear, incidentals, 50 per cent.	54	0
Making 120 super feet net ...	160	0

See Table for Labour Laying and Jointing.

CEMENT BUILDING BLOCKS.

The cost of these ornamented faced structures varies considerably, according to the method used in construction.

The cost can be ascertained by measuring the dimensions of concrete block, deducting material of voids in the particular block, and reckoning various materials used, and labor—mixing and casting and drying, &c.

Only a few face patterns are given below. The makers supply about 50 or 60 different pattern blocks, the variety being chosen as required in construction. For particulars and full catalogues of same,

Concrete Building Block Patterns.

CEMENT PRESSED BRICKS.

It may be to the advantage of a builder in suitable localities, where sand is easily procured, to make this kind of brick on the site.

Two men can make with a **9-brick machine** 4000 to 5000 bricks in 10 hours—one man mixing, and one man running the machine.

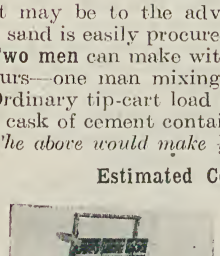
Ordinary tip-cart load of sand = 21 cubic feet.

1 cask of cement contains 3½ cubic feet.

The above would make ⅛ mixture of about 6 to 1.

Estimated Cost of 5000 Cement bricks.

	£	s.	d.
10 loads sharp clean sand at 7/-	3	10	0
10 casks of cement at 21/-	10	10	0
2½ loads of coke siftings 6/-	0	15	0
Materials	14	15	0
Labor—2 men, 10 hours each = 20 hours at 2/6...	2	10	0
Wear and tear and water, add 10 per cent. ...	1	15	0
Net cost of 5000 bricks= ...	19	0	0



Cement 9-brick Machine. Price £85.

See Advt pages 7, 13, 19, 36.

Cost about £3/16/ per 1000 on a 9 brick machine.

Extra handling in drying, wheeling, &c., to be added.

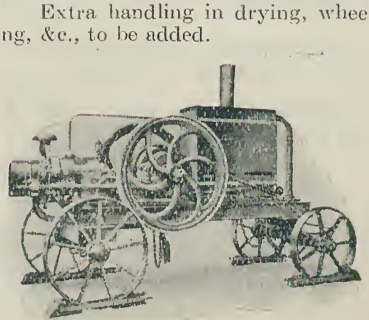
BLACKSTONE PORTABLE KEROSENE OIL ENGINE.

5½ H.P., 360 R.P.M., two fly wheels and standard pulley, mounted on W.I. wheels. Complete with horse shafts and tarpaulin, £216.

Price: 7 H.P. ditto, £242. 9 H.P., £278.

4 H.P. Bentall Petrol Kerosene Engine, 500 R.P.M., stationary. Price: £79 10s.

See advt., p. 13.



CONCRETE MIXING MACHINERY.

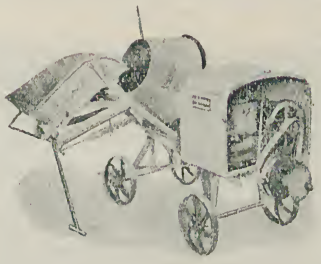
There are many distinct kinds of concrete mixers and engines for driving same, combined and otherwise, suitable for all classes of work. The names and prices mentioned under are strictly for the *reference* and judgment of the contractor and are not intended for advertising any particular make. This is left to the agents and local manufacturers, to whom I refer. They claim to save at least 10 per cent. in labor compared to hand mixing.

The conical tilting drum has proved one of the most serviceable types of concrete mixer for the general builder or contractor.

It gives a clean delivery into barrow (3½ c. ft.) underneath at each side at will for discharging into forms of construction.

The large mouth is to give speedy operation, and visible mixing, the entire bowl including the central bearing is one casting, ensuring perfect alignment, and minimising shocks from moving contents, also no corners to clog and plows; are self-cleaning, an important item.

Petrol engine driven in steel cover on 2 or 4 wheels as desired.



Conical Tilting Drum, capacity dry material, 7 c, ft. mixed concrete, per batch, 4 c. ft.

A " Rex " 3½ cubic feet batch mixer or half bag size.
Approx. weight without charger, 1 cwt., price £120.
With elevating charging skip, £140.

A 3½ cub. feet batch mixing machine will mix 16 cub. ft. per day.

See agent advt., p. 13.

The above type of machinery is also made in 3 sizes, to take a bag of cement in a 4 : 2 : 1 mix. Weight 35 cwt., capacity 60 c. yds. per 8 hours.

Extra large model fitted with kerosene engine, 5 to 7 h.p. or electric motor, or belt drive power if desired. Capacity, 120 cub. yds. per day. Approx. weight 65 cwts., approx. price, £500.

The agents' names of above types are different, viz., " Austral," " Champion," " Multimix," " Rex," and " Age."

See advt., pp. 6, 7, 13, 14, 19, 36.

CONCRETE MIXERS AND DISTRIBUTORS.

Suspended arm for road construction called the "Paver," £1,860. For particulars, *see advt., pp.* 7, 13.

The **Flumes** for mast or timber tower distributors of concrete cost, price per foot run, 25/–.

The continuous revolving batch drum mixer with reversible discharging chute.

An elevating charging hopper or skip from ground level, accessible roller chain drive around drum from counter shaft level with top of drum.

Control water tank with gauge glass for exact supply of water required to each batch.

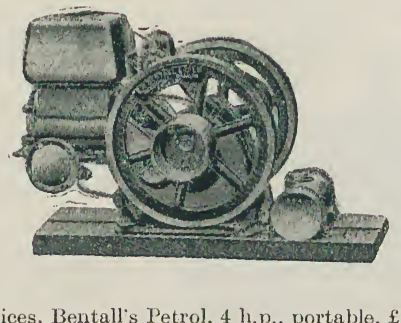
When the water tank is not required, the necessary piping with a 1in. quick opening gate valve, requiring a ¾in. hose connection.

A single cylinder gasoline or oil engine is required for a 4 c. ft. mixer.

A double cylinder 8.H.P. gasoline engine, fitted with high tension waterproofed magneto. Automobile type carburettor and fly ball governor for a 7 cub. ft. mixer of the larger machines.

Stationary or kerosene engine, 5 and 7 h.p., 4 cycle type, water cooled. The piston and connecting rod, etc., are enclosed in a steel housing.

3½ to 4 b.h.p. petrol engine with high tension rotary magneto, mounted on carriage. British make.



Approx. prices, Bentall's Petrol, 4 h.p., portable, £132.
Spring injection, Blackstone, kerosene, 5 h.p., £118, portable.
"Pioneer," 5 h.p., petrol, £73.
For various makes, *see advt., pp.* 7, 13, 19.

CERAMIC FACING FOR BUILDINGS.

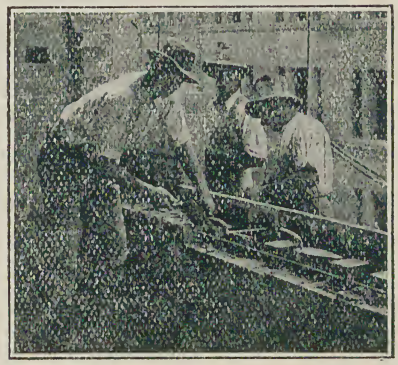
INTRODUCED IN MARTIN PLACE GOVT. SAVINGS BANK OF N.S.W.

For the external facing of the huge premises for the N.S.W. Government Savings Bank, the architects (Messrs. Ross and Rowe) have employed specially shaped briquettes or "tesserae," with glossy glazed exposed faces of light mauve shade.

These briquettes measure 4in. square by 4in. maximum depth, and are shaped to form a key with the concrete at back; but are *flat-bedded* so that they can be built in layers like ordinary brickwork. The finished effect is, in a sense, a mosaic of small units, and this character is carried through the ornamental, as well as the plain surfaces.

See illustrated Methods of Fixing Facings in Brickwork and Concrete Sections.

Probably the cost is somewhat greater than sandstone, but the effect achieved is everlasting and untarnishable by weather or age.



Method of bonding architectural terra cotta wall facing to brickwork.

Further particulars in detail of cost not yet exactly known locally, can be obtained by reference to the manufacturers' advt., pp. 3 and 26.

In "faience" work or modern facing of concrete and brick buildings, the bricklayers have a new exacting employment between that of a wall tiler and their trade.

THE ACTION OF CHEMICALS ON CONCRETE ONLY.

M. A. Stanley, C.E.

Name of Agent.	Formula.	How does it Attack Concrete.
Distilled Water	H_2O	Very Slowly
Sea Water	H_2ONaCe $MgCl_2$, etc.	Very slowly.
Caustic Soda	NaAH	Very slowly.
Caustic Potash	KOH	Very slowly.
Sulphuric Acid conc. 666 ...	S_2SO_4	Quickly Concrete moist.
Sulphuric Acid conc. 25% ...	S_2SO_4	Very quickly.
Sulphuric Acid conc. 10% ...	S_2SO_4	Very quickly
Hydrochloric Acid conc. ...	HCL	Very quickly
Nitric Acid conc.	HNO_3	Very quickly.
Nitric Acid conc. 10% ...	HNO_3	Very quickly
Phosphoric Acid conc.	H_3PO_4	Quickly.
Phosphoric Acid conc. 10% ...	H_3PO_4	Quickly
Oleic Acid	$O_{17}H_{33}$ CO_2H	Considerably.
Tannic Acid	$C_{14}H_1C_9$	Considerably.
Acetic Acid 10%	CH_3CO_2H	Quickly
10% Tartaric Acid	$C_4H_6O_6$	Strongly.
10% Oxalic	$C_2H_2O_4$	Strongly
10% Lactic Acid	$C_2H_6O_3$	Strongly.
Crenylic Acid 100%	C_7HgO	Little
Picric Acid conc.	$C_6H_2(NO_2)_3CH$	Little.
Ammonium Sulphate 10% ...	$(N_4H)_2SO_4$	Considerably.

THE ACTION OF CHEMICALS ON CONCRETE ONLY. (*continued.*)

Name of Agent.	Formula.	How does it Attack Concrete.
Ammonium Chloride 10% ...	NH_4Cl	Considerably.
Ammonium Nitrate 10% ...	NH_4NO_3	Considerably.
Common Salt	$NaCl$	Little.
Sodium Thiosulphate	$Na_2S_2O_3$	Little.
Sodium Acid Phosphate ...	NaH_2PO_3	Considerably.
Sodium Permanganate ...	$NaMnC_4$	Little.
Calcium Chloride	$CaCl_2$	Little.
Magnesium Chloride	$MgCl_2$	Little.
Magnesium Sulphate	$MgSO_4$	Considerably.
Barium Chloride	$BaCl_2$	Little.
Stannous Chloride (Tin Salt) ...	$SnCl_2$	Little.
Aluminium Chloride	$AlCl_3$	Strongly.
Ferro Chloride	$FeCl_3$	Strongly.
Mineral Oil	Hydro-Carbon	Little.
Benzine	Hydro-Carbon	Little.
Kerosene	Hydro-Carbon	Considerably.
Coal Tar	Hydro-Carbon	Little.
Fats	Clyderide of Fatty Acids.	Strongly.
Turkey Red Oil	Sulphurated Castor Oil	Strongly.
Soap Solutions	Alkali Salts of Fatty Acid	Considerably.
Sugar	$C_{12}H_{22}O_{11}$	Little.

RODS FOR REINFORCING CONCRETE.

Diam. of Rods	PERIMETERS OF A NUMBER OF ROUND RODS. (*M. S. Stanley, A.M.I.E.A*).									
	1 rod	2 rods	3 rods	4 rods	5 rods	6 rods	7 rods	8 rods	9 rods	10 rods
1/8	.3926	.7852	1.1778	1.5704	1.963	2.3556	2.7482	3.1408	3.5334	3.92
3/16	.589	1.178	1.767	2.356	2.945	3.534	4.123	4.712	5.301	5.896
1/4	.7854	1.5708	2.3562	3.1416	3.927	4.7124	5.4978	6.2832	7.0686	7.854
5/16	.9817	1.9634	2.9451	3.9268	4.9085	5.8902	6.8719	7.8536	8.8353	9.817
3/8	1.178	2.356	3.534	4.712	5.89	7.068	8.246	9.424	10.602	11.78
7/16	1.374	2.748	4.122	5.496	6.87	8.244	9.618	10.992	12.366	13.74
1/2	1.57	3.14	4.71	6.28	7.85	9.42	10.99	12.56	14.13	15.7
9/16	1.767	3.534	5.301	7.068	8.835	10.602	12.369	14.136	15.903	17.67
5/8	1.963	3.926	5.889	7.852	9.815	11.778	13.741	15.704	17.667	19.63
11/16	2.159	4.318	6.477	8.636	10.795	12.954	15.113	17.272	19.431	21.59
3/4	2.356	4.712	7.068	9.424	11.78	14.136	16.492	18.848	21.204	23.56
13/16	2.552	5.104	7.656	10.208	12.76	15.312	17.864	20.416	22.968	25.52
7/8	2.748	5.496	8.244	10.992	13.74	16.488	19.236	21.984	24.732	27.48
15/16	2.945	5.89	8.835	11.78	14.725	17.67	20.615	23.56	26.505	29.45
1	3.141	6.282	9.423	12.564	15.705	18.846	21.987	25.128	28.269	31.41
1 1/16	3.3392	6.678	10.017	13.357	16.696	20.035	23.3744	26.7136	30.0528	33.392
1 1/8	3.534	7.068	10.602	14.136	17.67	21.204	24.738	28.272	31.806	35.34
1 3/16	3.7321	7.464	11.196	14.928	18.661	22.393	26.1347	29.8568	33.5889	37.321
1 1/4	3.927	7.854	11.781	15.708	19.635	23.562	27.489	31.416	35.343	39.27
1 5/16	4.125	8.25	12.375	16.5	20.625	24.75	28.875	33.	37.125	41.25
1 3/8	4.319	8.638	12.957	17.276	21.695	25.914	30.233	34.552	38.871	43.19

The above table is read vertically and horizontally and gives the circumference of any number of rods from 1/8in. to 1 3/8. Thus, ten 1in. rods have a total circumference or perimeter equal to 31.41 inches.

CIRCULAR COLUMNS.					HEXAGON COLUMNS.				
Diam. in Inches	Area in Square ins.	Perimeter in inches	Weight in pounds per lin. foot	Volume in cubic ft. per lineal ft.	Min. Dia. in Inches	Area in square ins.	Perimeter in inches	Weight in pounds per lin. foot	Volume in cubic ft. per lineal ft.
12	113.1	37.70	117.8	.78	12	119.3	39.76	124.3	.83
13	132.7	40.84	138.2	.92	13	140.0	43.08	145.8	.97
14	153.9	43.98	160.3	1.07	14	162.4	46.39	169.2	1.12
15	176.7	47.12	184.1	1.22	15	186.4	49.7	194.2	1.29
16	201.1	50.27	209.5	1.40	16	212.1	53.02	220.9	1.47
17	227.0	53.41	236.5	1.57	17	239.4	56.33	249.4	1.66
18	254.5	56.55	265.1	1.77	18	268.4	59.65	279.6	1.86
19	283.5	59.69	295.3	1.97	19	299.1	62.99	311.6	2.08
20	314.2	62.83	327.3	2.18	20	331.4	66.27	345.2	2.30
21	346.4	65.97	360.8	2.40	21	365.3	69.59	380.5	2.53
22	380.1	69.12	395.9	2.64	22	401.0	7.29	417.7	2.78
23	415.4	72.26	432.8	2.88	23	438.2	76.21	456.5	3.04
24	452.4	75.4	471.2	3.14	24	477.2	79.53	479.1	3.31
25	490.9	78.54	511.4	3.41	25	517.8	82.84	539.4	3.59
26	530.9	81.68	553.0	3.69	26	560.0	86.16	583.3	3.89
27	572.6	84.82	596.5	3.97	27	603.9	89.47	629.1	4.19
28	615.8	87.96	641.5	4.27	28	649.5	92.78	676.6	4.51
29	660.5	91.11	688.0	4.59	29	696.7	96.10	725.7	4.84
30	706.9	94.25	736.3	4.91	30	745.6	99.41	776.7	5.17
31	754.8	97.39	786.2	5.24	31	796.1	102.72	829.3	5.52
32	804.2	100.53	837.7	5.58	32	848.3	106.04	883.6	5.89
33	855.3	103.67	890.9	5.94	33	902.2	109.35	939.8	6.26
34	907.9	106.81	945.7	6.30	34	957.7	112.66	997.6	6.64
35	962.1	109.96	1002.2	6.68	35	1014.8	115.98	1057.1	7.04
36	1017.9	113.10	1060.3	7.06	36	1073.6	119.29	1118.3	7.45
37	1075.2	116.24	1120.0	7.47	37	1134,1	122,61	1181.3	7.87
38	1134.1	119.38	1181.3	7.87	38	1196.3	125.92	1246.1	8.30
39	1194.6	122.52	1244.4	8.29	39	1260.0	129.23	1312.5	8.74
40	1256.6	125.66	1308.9	8.72	40	1325.5	132.55	1380.7	9.20

DATA FOR REINFORCEMENT IN CONCRETE FLOOR SLABS.

Dia. of Rod.	Area of Steel per foot width of slab using Round Rods of varying pitches.																			
	Area	1½″	1¾″	2″	2¼″	2½″	2¾″	3″	3¼″	3½″	3¾″	4″	4¼″	4½″	4¾″	5″	5¼″	5½″	5¾″	6″
⅛	.01227	.098	.084	.074	.065	.059	.054	.049	.045	.042	.039	.037	.035	.033	.030	.030	.028	.026	.025	.024
3/16	.02761	.221	.189	.166	.147	.133	.121	.110	.102	.095	.088	.083	.078	.074	.070	.066	.063	.060	.058	.055
¼	.0491	.393	.337	.295	.212	.236	.214	.196	.181	.169	.157	.147	.139	.131	.124	.118	.112	.107	.103	.098
5/16	.0767	.614	.526	.460	.409	.368	.335	.307	.283	.263	.245	.23	.217	.205	.194	.184	.175	.167	.160	.153
⅜	.1104	.883	.757	.662	.589	.53	.481	.442	.408	.379	.353	.331	.312	.294	.279	.265	.252	.241	.231	.221
7/16	.1503	1.202	1.030	.902	.802	.721	.656	.601	.555	.515	.481	.451	.424	.401	.38	.361	.344	.328	.314	.301
½	.1963	1.570	1.332	1.178	1.047	.942	.857	.785	.725	.666	.628	.589	.554	.523	.496	.471	.444	.428	.410	.393
9/16	.2485	1.988	1.704	1.491	1.325	1.193	1.084	.994	.918	.852	.795	.746	.702	.663	.628	.596	.568	.542	.520	.497
⅝	.3067	2.454	2.103	1.84	1.636	1.472	1.338	1.227	1.132	1.052	.981	.920	.866	.818	.773	.736	.701	.669	.641	.613
¾″								1.485	1.371	1.273	1.188	1.110	1.042	.990	.935	.891	.849	.809	.776	.742
⅞″								1.767	1.631	1.514	1.413	1.325	1.247	1.178	1.12	1.060	1.009	.964	.924	.883
1″												1.555	1.464	1.832	1.31	1.244	1.185	1.13	1.083	1.037
1⅛″												1.804	1.698	1.603	1.52	1.443	1.374	1.312	1.257	1.203

DATA FOR STEEL REINFORCEMENTS.

Dia. of Rods.	Weight in Pounds of Round Mild Steel Rods.														
	1′	2′	3′	4′	5′	6′	7′	8′	9′	10′	11′	12′	13′	14′	15′
⅛	.041	.082	.123	.164	.205	.246	.287	.328	.369	.41	.451	.492	.533	.574	6.15
3/16	.094	.188	.282	.376	.47	.654	.658	.752	.846	.94	.1034	1.128	1.222	1.316	1.41
¼	.167	.334	.501	.668	.835	1.002	1.169	1.336	1.503	1.67	1.837	2.004	2.171	2.338	2.505
5/16	.261	.522	.783	1.044	1.305	1.566	1.827	2.088	2.349	2.61	2.871	3.132	3.393	3.654	3.915
⅜	.376	.752	1.128	1.504	1.88	2.256	2.632	3.008	3.384	3.76	4.136	4.512	4.888	5.264	5.64
7/16	.511	1.022	1.533	2.044	2.555	3.066	3.577	4.088	4.599	5.11	5.621	6.132	6.643	7.154	7.665
½	.668	1.336	2.004	2.672	3.34	4.008	4.676	5.344	6.012	6.68	7.348	8.016	8.684	9.352	10.02
9/16	.845	1.69	2.535	3.38	4.225	5.07	5.915	6.76	7.605	8.45	9.295	10.14	10.985	11.83	12.675
⅝	1.044	2.088	3.132	4.176	5.22	6.264	7.308	8.352	9.396	10.44	11.484	12.528	13.572	14.616	15.66
11/16	1.263	2.526	3.789	5.052	6.315	7.578	8.841	10.104	11.367	12.63	13.893	15.156	16.319	17.582	18.845
¾	1.503	3.006	4.509	6.012	7.515	9.018	10.521	12.024	13.527	15.03	16.533	18.036	19.539	21.042	22.545
13/16	1.764	3.528	5.292	7.056	8.82	10.584	12 348	14.112	15.876	17.64	19.404	21.168	22.932	24.696	26.46
⅞	2.045	4.092	6.138	8.184	10.23	12.276	14.322	16.368	18.114	20.46	22.506	24.552	26.598	28.644	30.69
15/16	2.349	4.698	7.047	9.396	11.745	14.094	16.443	18.792	21.141	23.49	25.839	28.188	30.537	32.886	35.235
1″	2.673	5.346	8.019	10.692	13.365	16.038	18.711	21.384	24.057	26.73	29.403	32.076	34.749	37.422	40.095
1⅛	3.382	6.764	10.146	13.528	16.91	20.292	23.674	27.056	30.438	33.82	37.202	40.584	43.966	47.348	50.73
1¼	4.176	8.352	12.528	16.704	20.88	25.056	29.232	33.408	37.584	41.76	45.936	50.112	54.288	58.464	62.64
1⅜	5.053	10.106	15.159	20.212	25.265	30.318	35.371	40.424	45.477	50.53	55.583	60.636	65.689	70.742	75.795
1½	6.013	12.026	18.039	24.052	30.065	36.078	42.091	48.104	54.117	60.13	66.143	72.156	78.169	84.182	90.195

Diam. of Rods.	AREAS IN SQUARE INCHES OF A NUMBER OF ROUND RODS. Number of Rods.										
	1′ 0″	1	2	3	4	5	6	7	8	9	10
1/8	.041	.01227	.02454	.03681	.04908	.06135	.07362	.08559	.09816	.11043	.1227
3/16	.094	.02761	.05522	.08283	.11044	.13805	.16566	.19321	.22088	.24849	.2761
1/4	.167	.04908	.09816	.14724	.19632	.24540	.29448	.34356	.39264	.44172	.4908
5/16	.261	.07669	.15338	.23007	.30696	.38345	.46014	.53683	.61352	.69021	.7669
3/8	.376	.1104	.2208	.3312	.4416	.5520	.6624	.7728	.8832	.9936	1.104
7/16	.511	.1503	.3006	.4509	.6012	.7515	.9018	1.0521	1.2024	1.3527	1.503
1/2	.668	.1963	.3926	.5889	.7852	.9815	1.1778	1.3741	1.5704	1.7667	1.963
9/16	.845	.2485	.4970	.7455	.9940	1.2425	1.4901	1.7395	1.988	2.2365	2.485
5/8	1.044	.3067	.6134	.9201	1.2268	1.5335	1.8402	2.1469	2.4536	2.7603	3.067
11/16	1.263	.3712	.7424	1.1136	1.4848	1.8560	2.2272	2.5984	2.9696	3.3408	3.712
3/4	1.503	.4417	.8834	1.3251	1.7668	2.2085	2.6502	3.0919	3.5336	3.9753	4.417
13/16	1.764	.5184	1.0368	1.5552	2.0736	2.592	3.1104	3.6288	4.1472	4.6656	5.184
7/8	2.046	.6013	1.2026	1.8039	2.4052	3.0065	3.6078	4.209	4.8104	5.4117	6.013
15/16	2.349	.6902	1.3804	2.0706	2.7608	3.4510	4.1412	4.8314	5.5216	6.2118	6.902
1	2.673	.7854	1.5708	2.3562	3.1416	3.9270	4.7124	5.4978	6.2832	7.0686	7.854
1 1/8	3.382	.9940	1.9880	2.982	3.976	4.97	5.964	6.958	7.952	8.946	9.940
1 1/4	4.176	1.227	2.454	3.681	4.908	6.135	7.362	8.589	9.816	11.043	12.27
1 3/8	5.053	1.484	2.968	4.452	5.936	7.420	8.904	10.388	11.872	13.356	14.84
1 1/2	6.013	1.767	3.534	5.301	7.068	8.835	10.602	12.369	14.136	15.903	17.67

The parallel stirruped web girder system of reinforcements for concrete floors forming arched channels between about 2 feet wide running from wall to wall, thus eliminating the dead weight from the heavy slab type.

The moulding forms are made of curved gal. iron sheets.

See David Jones' Warehouse, near St. James Underground Ry. Station.

The B.R.C. Co. Ltd., Manchester, have introduced a permanent flat bottom moulded breeze tubing between, as a moulding form, setting on ledge of concrete web girder and level with ceiling line of girder.

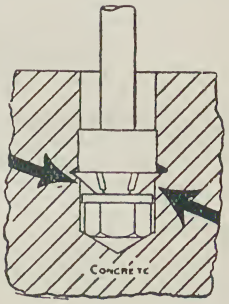
RAWLPLUG BOLT ANCHOR.

A Device made for Securing Bolts to Concrete.

The illustration shows a truncated cone of chilled iron attached to a short cylinder of lead made in sizes to fit bolts from $\frac{3}{8}$ inch to $1\frac{1}{4}$ inch dia. This iron cone is divided into segments at the inserted end which are fractured by the action of caulking, and **expand** ,forcing the cutting edges into the wall of the hole bored and so wedging the lead firmly against the **bolt head** and shaft or barrel of bolt and the walls of the hole.

The space left round the **bolt** is filled with Portland cement to minimise **side strains** and to consolidate the material.

Fitments can be immediately bolted up under great stress. In good concrete for small bolt sizes, a depth of hole about 4 inches is sufficient ; for larger bolts, 6 to 9 inches deep.



To facilitate caulking effectively, the lead cylinder of the larger size **bolt anchor** is made in two sections. For excessively strong fixing, **two anchors** should be used instead of **one,** being thoroughly " caulked," one at a time. For overhead fixing, they bear excellent results.

Extract from " The Sun," Sydney, Nov. 29th, 1926.

Amongst others, the N.S.W. Government Railways have availed themselves of the obvious advantages of this device, and Rawlplugs Bolt Anchors are now being extensively used in the construction of the city railway.

Size of Bolt dia. ...	...	$\frac{3}{8}$in.	$\frac{1}{2}$in.	$\frac{5}{8}$in.	$\frac{3}{4}$in.	1in.	$1\frac{1}{4}$in.
Anchors for Bolts Price per doz.	...	15/-	20/-	26/-	35/-	46/-	60/-
Dia. of Drilling Tool required ...	...	$\frac{7}{8}$in.	$1\frac{1}{8}$in.	$1\frac{3}{8}$in.	$1\frac{5}{8}$in.	2in.	$2\frac{1}{2}$in.

Price of Boring Tools, 8/4, 11/- each. Caulking Tools, any size, 7/6 each.

Electric or Pneumatic Power Drill should be used.

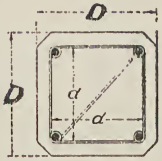
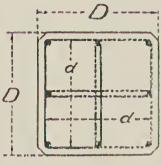
For further information, see advt., p. 5.

A series of tests has recently been carried out by R. H. Stranger, A.M.I.C.E. in London, also P. H. Russell, University of Sydney.

Mr. Stranger reports 28 tests to destruction, and that in 13 cases the bolt broke, and in four others the block split. These tests were with a Buckton horizontal testing machine by a direct pull to the ultimate resistance of the anchors, when fixed in holes in reinforced concrete and granite blocks.

TABLE 2

COLUMNS—with ends fixed—centrally loaded. Reinforced with Round Steel Bars and B.R.C. Hoops and Helical Wrappings (not otherwise applicable)

Reference No.	Type of Column Section	No. of Bars	D (ins.)	d (ins.)	Diam. of Bars	SAFE LOADS—TONS LENGTH OF COLUMN (FEET) 10	14	18	22	26	30
C41		4	10	7	$\frac{5}{8}$"	17	16	14	12		
C42					$\frac{3}{4}$"	19	18	16	14		
C43					$\frac{7}{8}$"	22	20	18	16		
C44		4	11	8	$\frac{3}{4}$"	23	22	20	18	16	
C45					$\frac{7}{8}$"	26	24	22	20	18	
C46					1"	28	26	24	22	20	
C47		4	12	9	$\frac{3}{4}$"	28	26	24	22	20	
C48					$\frac{7}{8}$"	30	28	26	24	22	
C49					1"	33	31	29	27	25	
C410		4	13	10	$\frac{7}{8}$"	35	33	31	29	27	25
C411					1"	38	36	34	32	30	28
C412					$1\frac{1}{8}$"	41	39	37	35	33	31
C413		4	14	11	$\frac{7}{8}$"	41	39	37	35	33	31
C414					1"	44	42	40	38	36	34
C415					$1\frac{1}{8}$"	47	45	43	41	39	37
C416		4	15	12	1"	50	48	46	44	42	40
C417					$1\frac{1}{8}$"	53	51	49	47	45	43
C418					$1\frac{1}{4}$"	57	55	53	51	49	47
C419		4	16	13	1"	57	55	53	51	49	47
C420					$1\frac{1}{8}$"	60	58	56	54	52	50
C421					$1\frac{1}{4}$"	63	61	59	57	55	53
C422		4	17	14	1"	64	62	60	58	56	54
C423					$1\frac{1}{8}$"	67	65	63	61	59	57
C424					$1\frac{1}{4}$"	70	68	66	64	62	60
C81		8	14	11	1"	56	54	52	49	46	43
C82			15	12	1"	62	60	57	54	51	48
C83			16	13	1"	69	67	65	62	59	56
C84			17	14	1"	78	78	75	72	69	66
C85			18	15	1"	86	86	83	80	77	74
C86			19	16	1"	95	95	93	90	87	83
C87			20	17	1"	106	106	103	100	97	93
C88			21	18	1"	116	116	116	116	110	104
C89			22	19	1"	127	127	127	127	121	114
C810			23	20	1"	138	138	138	138	132	125
C811			24	21	1"	150	150	150	150	150	150
C812			25	22	1"	161	161	161	161	161	161
C813			26	23	1"	174	174	174	174	174	174
C814			27	24	1"	188	188	188	188	188	188

For columns with one end free take $\frac{3}{4}$ of the above loads.
For columns with both ends free take $\frac{3}{5}$ of the above loads.

RECTANGULAR BEAMS—

Reinforced with Round Steel Bars and B.R.C. Stirrups.

TABLE 6—with ends freely supported.

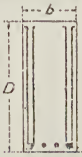
Reference No.	Type of Beam	Width of Beam b (ins.)	No. of Bars	Diam. of Bars (Round)	Total Depth of Beam D (ins.)	Weight of Beam per ft. run (lbs.)
R11		4	1	½″	10	40
R21		7	2	½″	10	70
R22			2	⅝″	12	84
R23			2	⅝″	14	98
R31		10	3	⅝″	14	140
R32			3	⅝″	16	160
R33			3	⅝″	18	180
R34			3	¾″	20	200
R35			3	¾″	22	220
R36			3	¾″	24	240
R41		13	4	¾″	22	286
R42			4	¾″	24	312
R43			4	⅞″	26	338
R44			4	⅞″	28	364
R45			4	1″	28	364
R46			4	1″	32	416
R47			4	1″	36	468

TABLE 7—continuous or with ends fixed.

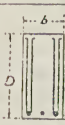
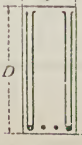
RC11		4	1	½″	10	40
RC21		7	2	½″	10	70
RC22			2	⅝″	12	84
RC23			2	⅝″	14	98
RC31		10	3	⅝″	14	140
RC32			3	⅝″	16	160
RC33			3	⅝″	18	180
RC34			3	¾″	20	200
RC35			3	¾″	22	220
RC36			3	¾″	24	240
RC41		13	4	¾″	22	286
RC42			4	¾″	24	312
RC43			4	⅞″	26	338
RC44			4	⅞″	28	364
RC45			4	1″	28	364
RC46			4	1″	32	416
RC47			4	1″	36	468

TABLE 6—SAFE LOADS—UNIFORMLY DISTRIBUTED—TONS

The following Table must only be used where the Bars are fitted with B.R.C. Stirrups to resist shearing stresses

Reference No.	SPAN IN FEET								
	4	6	8	10	12	14	16	18	20
R11	1·7	1·1	0·8	0·6	0·5	0·4			
R21	3·4	2·3	1·7	1·3	1·1	0·9			
R22	5·7	3·8	2·8	2·3	1·9	1·6	1·4		
R23	7·7	5·1	3·8	3·1	2·5	2·2	1·9	1·7	1·5
R31	11·0	7·3	5·5	4·4	3·6	3·1	2·7	2·4	2·2
R32	13·7	9·1	6·8	5·4	4·5	3·9	3·4	3·0	2·7
R33	15·6	10·4	7·8	6·2	5·2	4·4	3·9	3·4	3·1
R34	24·6	16·4	12·3	9·8	8·2	7·0	6·1	5·4	4·9
R35	28·3	18·9	14·3	11·3	9·4	8·1	7·1	6·5	5·6
R36	31·2	20·8	15·6	12·5	10·4	6·9	7·8	6·9	6·2
R41	38·0	25·4	19·0	15·2	12·7	10·9	9·5	8·4	7·6
R42		32·6	24·5	19·6	16·3	14·0	12·3	10·9	9·8
R43		38·0	28·5	22·8	19·0	16·3	14·2	12·7	11·4
R44		42·6	32·0	25·6	21·3	18·3	16·0	14·2	12·8
R45		46·0	34·3	27·5	22·8	19·6	17·2	15·2	13·7
R46		50·7	44·6	35·8	29·8	25·5	22·3	19·9	17·9
R47			54·5	43·5	36·3	31·0	27·2	24·2	21·7

TABLE 7—SAFE LOADS—UNIFORMLY DISTRIBUTED—TONS

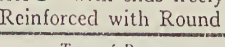
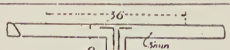
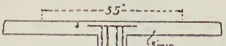
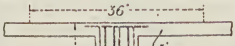
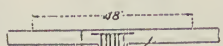
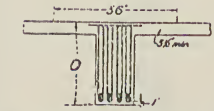
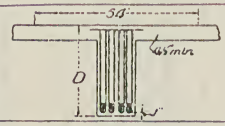
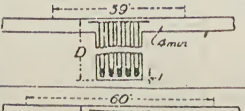
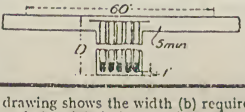
RC11	2·6	1·7	1·3	1·0	0·8	0·7			
RC21	5·2	3·4	2·6	2·0	1·7	1·5			
RC22	8·6	5·8	4·3	3·4	2·9	2·4	2·1		
RC23	11·6	7·7	5·8	4·6	3·8	3·3	2·9	2·5	2·3
RC31	16·5	11·0	8·3	6·6	5·5	4·7	4·1	3·7	3·3
RC32	20·5	13·7	10·2	8·2	6·8	5·8	5·1	4·5	4·1
RC33	23·5	15·6	11·7	9·3	7·8	6·7	5·8	5·2	4·7
RC34		24·5	18·4	14·7	12·3	10·5	9·2	8·2	7·3
RC35		28·4	21·3	17·0	14·2	12·1	10·6	9·4	8·5
RC36		31·2	23·4	18·7	15·6	13·4	11·7	10·4	9·4
RC41		37·8	28·4	22·7	19·0	16·2	14·2	12·6	11·4
RC42			37·0	29·5	24·6	21·0	18·4	16·4	14·7
RC43			42·9	34·3	28·6	24·5	21·4	19·0	17·1
RC44			48·0	38·4	32·0	27·4	24·0	21·3	19·2
RC45			51·5	41·2	34·4	29·4	25·8	22·9	20·6
RC46				53·7	44·8	38·4	33·6	30·0	26·8
RC47				65·5	54·5	46·7	41·0	36·4	32·7

The Safe Loads on Spans longer than 20ft. can be readily derived from the above, since the value—safe load × span—is constant for any one beam, but the depth of beam should not be less than $\frac{1}{24}$ span.

TABLE 8

T BEAMS—with ends freely supported.

Reinforced with Round Steel Bars and B.R.C. Stirrups.

Reference No.	Type of Beam b = width of Top ds = thickness of Slab br = width of Rib	Total Depth D (ins.)	Width of Rib br (ins.)	Minim'm Thickness of Slab–ds (ins.)	Minim'm value b × ds (sq. ins.)	Round Bars	
						No.	Diam.
T11		9	4	3	45	1	¾"
T12		9				1	⅞"
T13		9	4	3	108	2	1"
T14		11					
T21		10					
T22		12					
T23		14	7	3	99	4	¾"
T24		16					
T25		18					
T26		14					
T27		16	7	3½	147	4	1"
T28		18					
T29		20					
T31		16					
T32		18					
T33		20	10	3	108	6	¾"
T34		22					
T35		24					
T36		18					
T37		20					
T38		22	10	4	192	6	1"
T39		24					
T310		26					
T311		28					
T41		22					
T42		24					
T43		26	13	3½	126	8	¾"
T44		28					
T45		30					
T46		32					
T47		24					
T48		26					
T49		28	13	4½	243	8	1"
T410		30					
T411		32					
T51		28					
T52		30	16	4	156	10	¾"
T53		32					
T54		28					
T55		30	16	5	300	10	1"
T56		32					

The "Type" drawing shows the width (b) required when the slab is the minimum thickness allowed. If the thickness of the slab is increased the width (b) required is correspondingly less, as the product (b×ds) may be the same; (b) may be taken as the distance between ribs.

TABLE 8—SAFE LOADS—UNIFORMLY DISTRIBUTED—TONS

The following Table must only be used where the Bars are fitted with B.R.C. Stirrups to resist shearing stresses

Reference No.	SPAN IN FEET									
	10	12	14	16	18	20	22	24	26	28	30
T11	1·3	1·1	0·9								
T12	1·8	1·5	1·3								
T13	4·6	3·8	3·3								
T14	5·9	4·9	4·2	3·7	3·3						
T21	5·9	4·9	4·2	3·7							
T22	7·4	6·2	5·3	4·6	4·1	3·7					
T23	9·0	7·5	6·4	5·6	5·0	4·5	4·1				
T24	10·7	8·9	7·6	6·7	5·9	5·3	4·8	4·4	4·1		
T25	12·3	10·3	8·8	7·7	6·8	6·1	5·6	5·1	4·7	4·4	
T26	15·0	13·2	11·3	9·9	8·8	7·9	7·2				
T27	17·5	15·6	13·4	11·7	10·4	9·3	8·5	7·8	7·2		
T28	20·0	18·0	15·4	13·5	12·0	10·8	9·8	9·0	8·3	7·7	7·1
T29	22·5	20·5	17·5	15·3	13·6	12·3	11·1	10·2	9·4	8·8	8·2
T31	16·0	13·4	11·4	10·0	8·9	8·0	7·3	6·7	6·1		
T32	18·5	15·4	13·2	11·5	10·2	9·2	8·4	7·7	7·1	6·6	6·1
T33	21·0	17·5	15·0	13·1	11·6	10·5	9·5	8·7	8·0	7·5	7·0
T34	23·5	19·6	16·7	14·7	13·0	11·7	10·6	9·8	9·0	8·4	7·8
T35	26·0	21·6	18·5	16·2	14·4	13·0	11·8	10·8	10·0	9·3	8·7
T36	28·5	26·8	23·0	20·1	17·9	16·1	14·6	13·4	12·4	11·5	10·7
T37	32·1	30·5	26·2	22·9	20·3	18·3	16·6	15·2	14·1	13·1	12·2
T38	35·7	34·2	29·3	25·6	22·8	20·5	18·6	17·1	15·8	14·6	13·7
T39	39·3	37·9	32·4	28·4	25·2	22·7	20·6	18·9	17·5	16·2	15·1
T310	42·8	41·6	35·6	31·2	27·7	24·9	22·7	20·8	19·2	17·8	16·6
T311	46·4	45·3	38·8	34·0	30·2	27·2	24·7	22·6	20·9	19·4	18·1
T41	31·0	25·8	22·1	19·4	17·2	15·5	14·1	12·9	11·9	11·1	10·3
T42	34·3	28·3	24·5	21·4	19·1	17·1	15·6	14·3	13·2	12·2	11·4
T43	37·7	31·4	26·9	23·5	20·9	18·8	17·1	15·7	14·5	13·4	12·5
T44	41·0	34·2	29·2	25·6	22·7	20·5	18·6	17·1	15·8	14·6	13·6
T45	44·3	37·0	31·6	27·7	24·6	22·2	20·1	18·5	17·1	15·8	14·7
T46	47·7	39·7	34·0	29·8	26·5	23·8	21·6	19·9	18·4	17·0	15·9
T47	51·1	50·0	42·9	37·6	33·4	30·0	27·3	25·0	23·1	21·5	20·0
T48	55·7	54·9	47·1	41·2	36·6	33·0	30·0	27·5	25·3	23·6	22·0
T49	60·3	59·9	51·3	44·9	39·9	35·9	32·6	29·9	27·6	25·7	23·9
T410	65·0	64·8	55·5	48·6	43·2	38·8	35·3	32·3	29·9	27·8	25·9
T411	69·7	69·7	59·7	52·3	46·5	41·8	38·0	34·8	32·2	29·9	27·9
T51	50·8	42·4	33·3	31·8	28·2	25·4	23·1	21·2	19·5	18·1	16·9
T52	55·0	45·9	39·3	34·4	30·5	27·5	25·0	22·9	21·1	19·6	18·3
T53	59·2	49·4	42·3	37·0	32·9	29·6	26·9	24·6	22·7	21·1	19·7
T54	74·3	74·0	63·5	55·5	49·3	44·4	40·4	37·0	34·2	31·7	29·6
T55	80·0	79·9	68·5	59·5	53·2	47·9	43·6	39·9	36·9	34·2	31·9
T56	85·7	85·7	73·5	64·4	57·2	51·5	46·8	42·9	39·6	36·8	34·3

The tabulated loads to the left of the heavy black line do not develop the full bending strength of the beam, but greater loads would exceed the shear strength and are not permissible.

COMPRESSED AIR.

ITS APPLICATION AND PERFORMANCE.

The following list contains possible applications of compressed air that have been suggested by the makers to the Builder or Contractor of various works for his consideration.

Agitating Asphalt, or any liquid except molten metal, **Scaling Asphalt** Tanks or Vats.

BOILER SHOPS. Running Chipper, Rivetting and Caulking Hammers.—Operating Drills, Reamers, Flue Rollers, Flue Expanders, Stay Bolt Cutters, Punchers, &c.—**Blowing Rivet Forges—Supplying Hoists Lifts and Jacks**—Cleaning Boiler Flues—**Removing Scale, Rust and Paint by the Sand Blast.**

AIR COMPRESSORS.

Consolidated Pneumatic Tool Co. (English Make).

PORTABLE PETROL DRIVEN AIR COMPRESSORS.

(100 and 360 cub. feet sizes.)

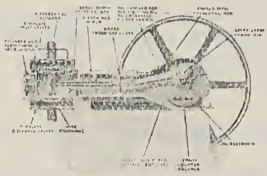
Approx. **H.P.** at 100 lbs. air pres., five sizes, 5¼in. dia. cylinder... 18
to 8¼in. dia. cylinder... 55
£585 to £1350.

Mounted on steel wheels, or flanged wheels for rails. Solid rubber tyres, or trailer with springs, on roller bearing and on skids. 18 H.P. only on Ford truck

Details as to capacity on application, *advt.*, pp. 7, 13, 19

BRIDGE BUILDERS. Operating Chipping and Rivetting Hammers, Drills, Reamers, Punchers, &c.—Supplying Air Hoists and Lifts—Blowing Rivet Forges—Cleaning Steel with the Sand Blast—Pneumatic Paint Spraying System.

STATIONARY AIR COMPRESSORS.



All powers
weight
From 6in. dia. cylinder 200 lbs.
5ft. 4in. x 2ft. 2in. floor space wide
to 20in. dia. cylinder 1400 lbs.
12ft. x 5½ft. floor space wide.
Prices range from
£131 to £1000.
Details on application to maker.
See advt. pp. 7, 13, 19.

Regulated by **Auto Pneumatic Throttle,** in conjunction with engine governor, and a differential unloader on the compressor.

CONTRACT WORK. Running Rock Drills, **Hammer Drills and Stone Channellers** Operating Pneumatic Hammers, Drills and Reamers —Calking Pipe Lines and Tanks—Running Pumps—Plug Drills in Trenching—Sheet Pile Drivers—Drill Sharpeners—Blowing Smith Fires—Submarine Drills—Subaqueous Tunnelling—Caisson Work—Steam Shovels.—Operating Direct-Acting Pumps—Running Coal Pick and Drill Sharpeners—Cleaning Boiler Flues—Pneumatic Tools for the Repair Shop—Air Hoists, Lifts and Motors—**Pile Drivers for Shaft Sinking**—Air Lift Pump for Water Supply of Mine Unwatering.

CUT STONE AND MONUMENTAL YARDS. Running Stone Tools, Polishers, &c., Letterings and Carving—Cleaning Carvings with the Air Jet—Air Hoists and Lifts—Running Plug Drills and Bush Hammers.

LITTLE GIANT MIDGET DRILLS (for Revolving Bits.)

All sizes ¼in. drilling to 2in., for metal, wood, tile, brick, or concrete and plaster. Length 13½in. to 14½in. Weight, 8 lbs., using approx. 14 cub. feet air per minute. ¼in.=10A, ⅜in.=10B, ½in. drilling capacity, with regulating trigger or handle.

Price, from £19 to £58.

Speed, approx. free, 1300 revolutions to 2950 revolutions per minute, free.

For further information *see Advt.* pp. 5, 7

QUARRIES. Rock Drills, Hammer Drills and Plug Drills—Stone Channellers—Hoists, Lifts and Motors—Drainage Pumping by Return-Air System—Operating Direct-Acting Pumps—Splitting Stone in the Bed.

PNEUMATIC TOOLS, ROCK DRILLS, BORERS and HAMMERS.

Sinker Rock Drills (*dry and wet*), one man **self-rotating hand hammer,** drilling holes in rock, concrete. In several sizes and weights. 55lbs., from £13/10/–. No. 5 plug and feather to £82/10/–.

Will operate with air up to about 30 ft.

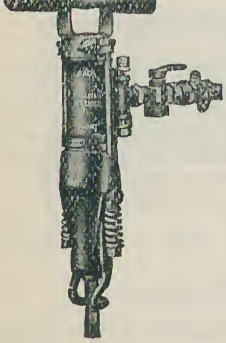
Strong blowing device clears the cuttings from bottom of holes.

A one inch hollow hexagon steel cutting tool is generally employed, also special rolled spiral shank tools for clearance of debris through which the compressed air is forced, at about 80 lbs. pressure and upwards (or water is used on sticky grounds).

The illustration is essentially the dry drill with water attachment.

SAW MILLS. Operating Edgers, Bumpers, Pick-Ups, &c.—**Blowing Sawdust and Shavings from Machines**—Pneumatic Haulage—**Pumping Water—Automatic Sprinkler Systems.**

SEWAGE AND TRENCH WORK. Rock and Hammer Drills—Sheet Pile Drivers—Caulking and Testing Pipe Lines.



AUGER ROCK DRILL.

Similar to Sinker Drill.

(Rotary.) With auger steel. Suitable for drilling in sticky formations, soft iron ore, anthracite, gypsum, slate, shale, talc, N.Z. Oamaru freestone, lime stone, marbles, kaolin, or asbestos. Price, from £12 to £50.

STRUCTURAL WORKS. Pneumatic Tools for Drilling, Reaming, Chipping, Scaling, Rivetting and Caulking—Air Hoists—Pneumatic Punches—Rock Drills and Plug Drills—Drainage Pumps.

Pneumatic hammer, for rivetting from 1⅛in. and under, length 14¾in., weight 16 lbs., 1500 blows per minute, with regulating trigger to handle ; to 1½in. and up, £16; length 15¾in., weight 17¾ lbs., 1400 blows per minute, £25 5s.

STONE OR METAL CHIPPING OR CAULKING HAMMERS.

Various sizes, from £13 to £13/10/-.

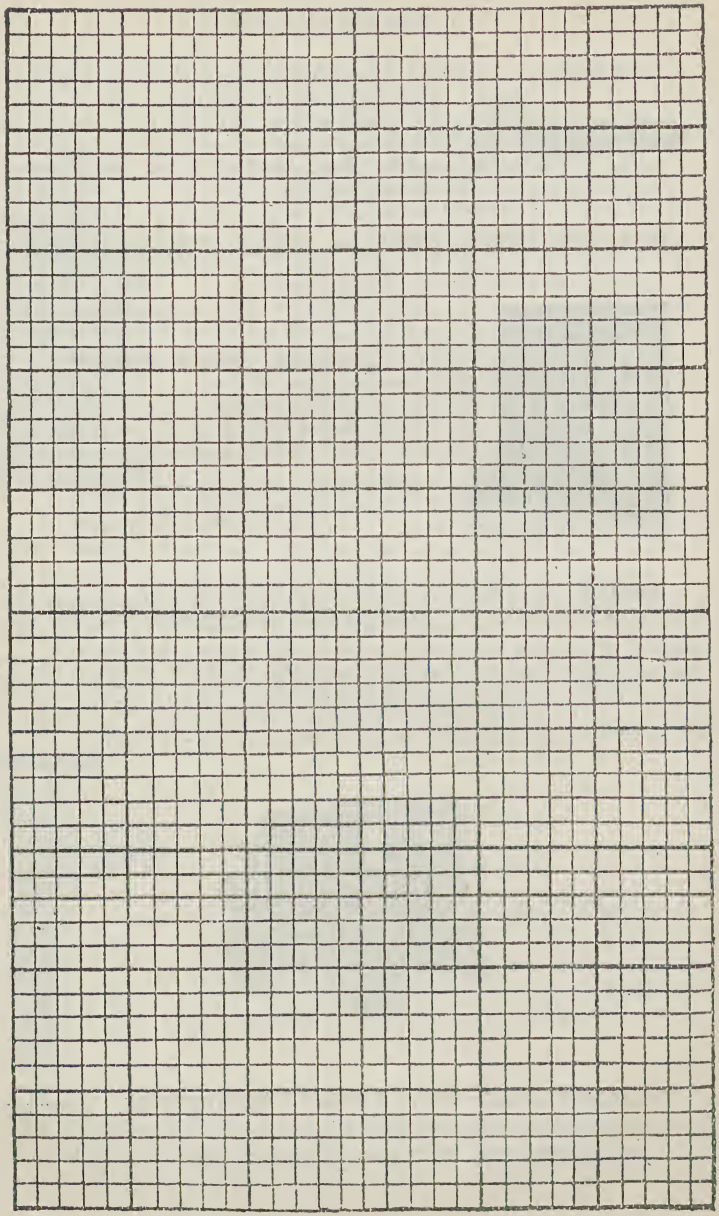
Stone Dressing Hammers.

5 sizes, from 9/16in. to 1¼in., and U valves.

Prices from £3/17/6 to £12.

MINING. Running Rock Drills and Hammer Drills—Return Air System for Station and Sump Pumping—Unwatering by the Air Lift System—Air Hoists and Motors—Pneumatic Tools for the repair shop—Operating Air Brakes on Hoists—Unloading Cars—Running Direct Acting Pumps—Drill Steel Sharpeners Blowing Smith Fires—Oil Furnaces for Steel Sharpeners—Pile Drivers for Shaft Work.

MUNICIPALITIES AND PUBLIC INSTITUTIONS. Pumping Water—Testing and Caulking Pipe Lines—Rock Drills in Road Construction—**Blowing Fire Whistles**—Filtration Plants.



CONSTANTS OF LABOR IN COSTING.

TABLE OF ROUGH AVERAGE DAY LABOR.

Being the average time taken to execute work in the different trades; compiled with great care from the work actually done by the Public Service of N.S.W.

The following tables, though not perfect, may be found useful for estimating the cost of labour only.

The approximate number of hours taken by the average skilled artisan can be ascertained for different kinds of work, using the constant of one hour and fractions of an hour as a multiplying factor.

It is impossible to lay down fixed rules under different conditions for every item in the different trades because they vary in very nearly every job. Plumbing work, being so varied, it is omitted from this schedule of proportions. The absolute correct valuing of quantities requires experience and practical knowledge and tenders differ accordingly.

METHOD REQUIRED TO USE THE TABLE.

Multiply the amount of existing wages or rate per hour of workmen for different trades by the number and decimal in the constant table to find the price of labor only.

To this, add the cost of material for each trade and the total will give the approximate estimated nett cost of the work without incidentals such as Waste of Material, Clerical Work, Cartage or Transport, Profit, etc.

FRACTIONS AND THEIR DECIMAL EQUIVALENTS.

1/64	0.0156	17/64	0.2656	33/64	0.5136	49/64	0.7656
1/32	0.03125	9/32	0.28125	17/32	0.53125	25/32	0.78125
3/64	0.0468	19/64	0.2968	35/64	0.5468	51/64	0.7968
1/16	0.625	5/16	0.3125	9/16	0.5625	13/16	0.8125
5/64	0.0781	21/64	0.3281	37/64	0.5781	53/64	0.8281
3/32	0.09375	11/32	0.34375	19/32	0.59375	27/32	0.84375
7/64	0.1093	23/64	0.3593	39/64	0.6903	55/64	0.8593
1/8	0.125	3/8	0.375	5/8	0.625	7/8	0.875
9/64	0.1406	25/64	0.3906	41/64	0.6406	57/64	0.8906
5/32	0.15625	13/32	0.40625	21/32	0.65625	29/32	0.90625
11/64	0.1718	27/64	0.4218	43/64	0.6718	59/64	0.9218
3/16	0.1875	7/16	0.4375	11/16	0.6875	15/16	0.9375
13/64	0.2031	29/64	0.4531	45/64	0.7031	61/64	0.9531
7/32	0.21875	15/32	0.46875	23/32	0.71875	31/32	0.96875
15/64	0.2343	31/62	0.4843	47/64	0.7343	63/64	0.9843
1/4	0.25	1/2	0.5	3/4	0.75	1	1.0

No. 1 EXAMPLES OF WORKING TABLE.

EXCAVATOR.	CONSTANT
	Pence
Average excavating, laborer's wage, per hour 2/6, say	30
multiplied by one, decimal four. *See Earth*	1.4
	120
	30
Answer = 3/6, — pence 12)	42.0
Add for incidentals, barrows, planking, tools and wear and tear and profit	1/6
Total per sub. yard	5/–

No. 2 EXAMPLE OF WORKING TABLE OF BRICKWORK.

BRICKLAYER.

	Tradesman and Laborer.
	Pence
Bricklayers' wages, 3/– per hour ...	36.00
Brielkayers' labourer, 2/7¼ per hour	31.25
Added together ...	67.25
Multiply by constant	45
	33625
	26900
	12)3026.25
	20)252.18

Labour only =	£12 8 3
Add materials 3,672 bricks at 80/–	14 15 9
4 bags lime at 8/–	1 12 0
4 loads sand, 7/– ...	1 8 0
	£30 4 0
Add 10% for profit ...	2 16 0
Present average contract price, Total per rod	£33 0 0

CONSTANTS OF LABOR IN HOURS AND DECIMALS.

EXCAVATOR:

	Labor Hours.
EXCAVATION ONLY, per cub. yard.	
Earth or loam	0.5
Clay or heavy ground	1.0
Gravel or hard ground	1.5
Digging, Throwing into Barrows and Wheeling, 50 yards.	
Earth	1.4

	(per cub. yard), Hours.
Gravel, clay, etc.	1.8
Filling in and Ramming	0.5
Clay Puddling.	
Tempering and laying 9in. thick ...	6.50
Ditto, in layers 12in. thick	5.50
Concrete.	
Mixing, wheeling depositing and ramming	2.30
Mixing, wheeling, spreading and levelling, 9in. thick, at per yard super	.080
Ditto, 12in. thick	1.10
Ditto, 18in. thick	2.00

BRICKWORK.

	Bricklayer & Laborer Hours.
Brickwork, per rod	45.00
9in. walls	51.32
Extra Labor.	
selected facings, per ft. sup.	51.2
Axed arches	.35
Gauged arches	.80
4½in. Brick walls.	
In cement	.15
Tuck-pointing, per yard super	2.50
Bricknogging, laid flat per yd. sup. ...	.68
Bricknogging, on edge	.66
Brick paving, laid flat in sand	.43
Ditto, on edge in sand	.65
Ditto, laid flat in mortar	.70
Ditto, on edge in mortar	.86

DRAINER.

4in. G.E. pipe laid, cement joints, including junctions, per foot run	.11
6in. Ditto	.16
9in. Ditto	.24
12in. Ditto	.31
18in. Ditto	.50
T.C. Lumber or "Konka" breeze blocks, per square, 10ft. x 10ft, viz. ...	4.00
Pantiling, laid dry, per sq....	4.00
Ditto, pointed outside ditto	6.40
Ditto, pointed both sides ditto	8.80
Plain Tiling, laid to a 4in. gauge, per sq.	7.00
Ditto, 3½in. ditto	7.20
Ditto, 3in. ditto	7.40

MASON.

	Hours.
Labour on Sydney Sandstone, per ft. sup.	
Sawing	.60
Plain work in beds and joints ...	1.25
Sunk work	1.20
Plain faced, rubbed	1.25
Ditto, circular	1.55
Sunk work, rubbed	1.63
Ditto, circular	1.75
Moulded work	2.00
Ditto, circular	3.00
Circular work to shafts of columns ...	3.00
Circular circular work	4.70

SLATER.

(**For Number of Slates to the Square**, *see Roof Section.*)

	Slater and Laborer Hours.
Preparing and laying	
Doubles, 10 x 6	3.90
Ladies, 16 x 8	2.60
Countesses, 20 x 10	1.90
Duchess, 24 x 12	1.55
Rendering Joints of Slating, per sup. yd.	.50

CARPENTER AND JOINER.

	Hour.
Oregon Pine, in trusses, per cub. ft. ...	1.35
Hand planing Pine, per ft. super	.13

	Per square
Centering, per square.	
For plain cylindrical arches	15.50
For groined arches	32.00
For trimmer arches, per ft. sup. ...	.55

ROUGH BOARDING, per square.

Thickness	Rough hours.	Jointed hours.
¾in.	... 2.20	3.00
1in.	... 2.38	3.18
1¼in.	... 2.62	3.42
1½in.	... 2.90	3.70

Clear Oregon Pine.

Battoning, per square (incl. plugging to wall	Hours.
¾in. to 1¼in. placed 12in. apart ...	2.59
H.W. Weather Boarding, per square ...	4.20
Gutter Boards and Bearers, per sq. ft.	
1 to 1½in.	.24
Md. Skirtings (including plugging), fixed, per ft. sup.	
¾in. square	.35
1in. square	.40
1½in. square	.75
Framed Grounds, per super ft.	
¾in. grounds	.55
1in.	.60
1¼in.	.65
1½in.	.74
Pine framed Partitions, per ft. super, hand labor.	
1½in. square framed	.50
1½in. moulded, one side	.60
Ditto, both sides	.70
2in. square framed	.50
Moulded, one side	.62
Ditto, both sides	.74
Window Linings, per ft. super.	
Inch Pine, two-panel square framed back linings	.95
Ditto, bead-butt or moulded ...	1.07
Ditto, bead flush or quirk moulded ...	1.13
Additional panels, each	.18
If moulded, add	.24
For splayed linings, add	.07
Framed Doors, 4 panels.	
If square framed, 1¼in.	.70
Ditto, 1½in.	.77
Ditto, 2in.	.89
Ditto, 2½in.	1.02
Door Jamb Linings, per ft. sup.	Hours.
1¼in. single rebated	.30
Ditto Double Ditto.	.38
1½in. 3 or 4 panel	.131
2in. dou. rebated	.48
3 or 4 panels	1.37

PINE STAIRCASES, PER SUPER FOOT.

(Including fixing on carriages and brackets.)

GRADES OF STRINGS, TREADS AND RISERS.

	Thickness of Treads.			
	1in.	1¼in.	1½in.	2in.
	Hours			
Rough, with edges shot	.29	.33	.37	.45
Wgt., with rounded nosings ...	.54	.60	.66	.78
Wgt., glued, and blkd., with rounded nosings	.61	.68	.75	.88
Ditto, if moulded	.70	.78	.85	.98
Add—If risers be tongued into the treads on one edge	.06	.07	.08	.09

STRINGS.

	To 1¼	To 1½	To 2
	Hours		
Add—If sunk	.25	.27	.30
If moulded	.13	.14	.15
If cut for steps and risers	.21	.22	.24
If cut for steps and risers and mitred	.60	.63	.66

Wreathed or circular strings are to be taken as 4 times the rate of straight.

Joinery Oregon Pine Wall Strings, ot per foot super.	Hours.
Plain and plugged, 1¼in.	.50
Ditto, 1½in.	.55
Ditto, 2in.	.62
If moulded, add	.18

Oregon Pine Handrails, per foot run	
Plain, 3in. x 3in.	.50
Moulded ... ... from	.75
Add for ramps ... ... from	.42
Ditto for wreaths ... ... from	10.00

Labor to mahogany, maple or cedar handrails, 1½ times that of Pine.

Plain Square Balusters, nailed in, per foot run.	Hours.
1in. x 1in.	.17
1¼in. x 1¼in.	.19
Dovetailed, extra per foot run	.08
Dovetails in steps, each baluster...	.25
Iron balusters, fixing	.50

Dados, per foot super.

	Hours.
Framed Dado, with dovetailed keys, joints secured with slips, etc., etc.	.70
Add—If raking, scribed to steps	.19
If to moulded nosings	.20
If base grooved into floor	.09
If circular on plan, twice the straight.	

Boxed Pilasters or Newels, per foot super.

1¼in. deal plain pilasters, glued and blocked	.94
1¼in. deal diminished newels, columns, glued and blocked	4.00

Add for **fluting,** single, .20 hours, double, .25 hours, treble, .40 hours

PLASTERER.

Tradesman, Laborer and Apprentice.

	Hours.
Rendering per yard super	.18
,, curved	.23
,, and setting with fine stuff	.32
,, and setting curved	.37
,, floating snd setting	·42
,, floating and setting curved	.52
Lathing	.18
,, curved	.25
Rendering with cement and sand	.40

The great value of this table is that **Wages** as they alter by circumstances and localities for the labour of tradesmen and otherwise, can be multiplied by these constants to suit each difference of each rise or fall of the current wage, and to find the cost of **labour** of the above mentioned items of work at all times. I have therefore omitted to give the detail cost of labour to work in **each section** of building trade as in previous editions.—C. E. Mayes.

PAVINGS.

Laid Complete, per sq. yard.

Bluestone Cement Concrete, 6in. thick, foundations	from 15/–
Tarred Blue Metal Screening, 1in. thick	from 3/6
Asphalte Fillet, 3 x 1, around basements or walls, per lineal yard	1/–

TARRED PAVEMENTS.

Bluestone Metal, 3in. thick, composed of 1¼ gauge metal, with 1in. top dressing of ⅜ screenings, and 20 per cent. dust, mixed in the proportion of 30 gallons of tar to 1 cubic yard screenings, rolled and sanded, per square yard ... ... from 6/0

DAMPCOURSES.

FOR 9 inch WALL OF VARIOUS MATERIALS, COMPARATIVE

	per roll.	per ft. net:	Fixed complete.
Malthoid and Ruberoid, for 9in. walls, 72ft.	15/–	–/2½	–/3
Tar and Sand, at –/6 per gallon, ¾in. thick ...			–/10
Anderson's Bitumen Rok, 9in. wide, 24ft.	12/–	–/6	–/7
Slates and Cement, double row, 20in. x 10in., Slates at £10 per 1000 = 833 ft., about –/3 per foot run			
For 9in. wall Slates –/3, cement and labour and waste, –/9			1/–
Lead Centred Dampcourse, 9in. wide, 10ft.	7/6	–/9	–/10
Leadite, 1lb. lead insert, 9in. wide, 10ft. roll, at	7/6	–/9	–/10
Lead, 2lbs. insert, at 55/– cwt., 9in. wide, 20ft.	15/–	–/9	–/10

MATERIALS FOR DAMP COURSE WALLS.

		Width of walls.	
Adamax, in rolls of 72ft.	7/6	15/–	20/–
Asphaltum, in rolls of 20ft.	4/3	8/6	13/6
Anderson's Rok Bitumen, in rolls of 24ft. ...	7/–	12/–	18/–
Resistoid Dampcourse	6/6	14/–	18/6
Ruberoid, in rolls of 72ft.	7/6	15/–	20/6
Maltha and Ormonide	5/9	11/6	17/3
Rexilite, 2 ply, in rolls of 72ft.	7/6	15/7	23/–
Rexilite, 3 ply, in rolls of 72ft.	8/–	16/–	24/–
Adamax	7/6	15/–	20/–
Ormo Ledcore, 1lb. lead	3/9	7/6	11/3
Crane Brand, 2lb. lead, in 20ft. rolls ...	7/6	15/–	
Slates and Cement, horizontal, dou row per sq. ft.			1/–
Ditto, vertically laid			1/9
Glazed earthen ware, 1¾in. thick			

4½in. Walls, 9d; 9in. walls, 1/3,; 13in. walls, 2/-; 18in. walls, 3/-.

Slate Dampcourse Material prices subject to fluctuation, delivered to Sydney and near suburbs.

9in. **Dampcourse** is sold by the 100-slates.

4½in. do., 100ft. a lap of 1in. is allowed on each slate.

9-inch DAMPCOURSE slate per 100s.

20 x 9, 50/–. 18 x 9, 45/–. 16 x 9, 40/–. 14 x 9, 35/–. 12 x 9, 30/–.

4½in. Dampcourse, 4½in., 12/6 per 100 lineal ft. (including all sizes).

RUBEROID AND MALTHOID DAMPCOURSE.

In Rolls.

Material only, laying and waste, per roll, 2/– extra to be added.
Width in inches 4¾in. 9½in. 14in. 18½in. 23in. 27½in. 36in.
Price per roll 72ft. 7/6 15/– 29/6 23/– 33/– 40/– 52/–
Maltha and Vulcanite Dampcourse, 4½in. wide, 5/9, 9in., 11/6 per roll, 14in., 17/3.
Jointing and Coating Paint for Roofs: 6/– per gal.; red, 8/–, covering per gal. 200 square feet to 250 square feet.
" Pudlo " Water Proofing Powder. Mix with Cement, then add Sand. If for Concrete Plaster work, 3 lbs. to 1 bag cement for protection weather, 5 lbs. to 1 bag cement for dampcourses, 6 lbs. to 1 bag cement for damp basements, tanks, &c. Finish with steel trowel. 1/6 per lb.

WATERPROOF FELTS AND SOUND DEADENING FELTS.

	Per Roll
P. & B. Asphalt Saturated Felt, in rolls 36in. wide x 10ft. 8in.	
No. 2, containing 324 sq. ft.	17/6
No. 3, containing 500 sq. ft.	18/–
Hardies, Saturated, 9 yard x 3ft.	22/6
Maltha Saturated, 72ft. x 3ft.	13/6
Noyes' Sanador Sound Deadening Felt, 25yds. x 32in.	57/6
Bituminous Hair Felt	70/–
Anderson's Asphalt Saturated Felts	20/–

Trinidad Roofing Felt, 66 p.c. Bitumen, 34 p.c. course fibric felt.

Fix strips of Deadening Felt on top of joists under floor boards, and similar sagged under joists between battens.

	Per Roll
" Certainteed " Roofing Material, in 72ft. rolls, 1 ply	30/–
2 ply	40/–
3 ply	50/–

Water proofing compounds, anti-corrosive, and special paints and materials, sanitary cement filler, R. & W., 1 gal. will cover 22 square yards first coat, and paint for concrete surfaces in 12 colours, from yellow to brown red.

Certainteed compound is similar to Hydroseal.

" Hydro-seal," a thick bituminous compound for trowling on surface of walls; useful in stopping leaks in all kinds of gutters, roofs, tanks, etc., repairing flashings, cracks in **Cement, Brickwork or Stonework.** 1 gal. will cover 35 to 40 square feet. Black, per gal. 8/6., white, per gal., 22/–.

It is very elastic as it dries on surface in 24 hours and stays soft underneath.

"Fabco Floatoid." For old roof. Same as Hydroseal, only thinner. A heavy paint. 1 gal. will cover 100 square ft. on smooth surface.

	per gal.	5 gal. drums.
Black	8/–	43/9
White	12/3	61/3

1 gal. covering capacity on iron — 15 sq. yds. Malthoid — 13.

In 4 gal. tins or 54 x 1ft. 6in. steel drums.

Black, 13/6 per gal. White, 17/6 per gal.

"Super Cote," a semi liquid waterproofing material, composed of Gilsonite, from which is derived pitch, long asbestos fibre, non-volatile oils, and various gums. (For covering concrete, malthoid, iron or composition roofs).

Resisto asphalte saturated felt.

Resisto red roof paint. per gal, 13/9.

Resistoid, a black coating paint, per gal., 12/– and 8/–.

Rok cold cement paint, for roofing or cement flooring. 1 gal. will cover 24 sq. yds. Price 12/–.

Rok hard (to be milled before use). Mastic. 1 gal. covers 50 sq. yds.

"Siderosthen" rust preventing solution; anti-corrosive and preservative against chemical action or salt water. For use on steel framed buildings, marine and iron work.

Black ...	¼ cwt. drums	... ...	108/–	per cwt.
Chocolate ...	¼ cwt. „	... ...	106/–	„
Black ...	1 gall. „	... ...	12/6	per gall.
Chocolate ...	1 gall. „	... ...	11/6	„
Green ...	1 gall. „	... ...	25/–	„
Grey ...	1 gall. „	... ...	2 4/–	„
White ...	1 gall. „	... ...	27/–	„
Red ...	1 gall „	... ...	20/–	„

See Noyes Bros. advt., *p.* 13.

"Silacene," a thick mastic compound for furnace repair work. A substitute for fire bricks.

Toxement patent R.I·W. waterproofing compound, for concrete or steel. Made in grey powder form, paste and damp resisting paint.

Yur-ite Australian product is a waterproofing compound or paste, used by plasterers in rendering building surfaces, concrete surfaces.

For below surface level, mix two gallons or 18½ lbs. with 1 bag of cement to 2 bags of sand. Render **walls** ¾in. thick, and **floors,** 1in. thick. Weight, 9½ lbs. to the American gallon. Price per lb., 1/3, or 17/6 per gallon.

The price of Yur-ite in plaster, ⅝ to ¾in. thick (exclusive of cost without the rendering in cement, 1 to 3 of sand is 1/7 per square yard, mixture 1 of cement to 2 of sand, 3/4 per square yard.

Manufacturers report that basements throughout Australia, public buildings, banks, hotels, and Wembley House have proved its effectiveness, although cheap. Australian Works: Redfern, Sydney.

DRAINER.

Glazed Earthenware Pipe Drains are measured at per foot run.

To include digging and filling in trenches at 5/– per c. yd. to average depth of 3 feet.

Labor laying to include jointing in cement, 3 to 1.

Skilled labor, 2/6 per hour.

LAID COMPLETE PER FOOT RUN.

Internal Dia. inches.	Lin. feet per ton.	Sydney price. Per ft.	Excavation.	Laying and jointing in cement.	Total cost.
		s. d.	s. d.	s. d.	s. d.
3	280	0 8½	0 7	0 3½ =	1 7
4	200	0 8½	0 7½	0 4 =	1 8
6	106	0 11½	0 9	0 6½ =	2 3
9	64	1 9	0 11	0 9 =	3 5
12	48	2 9	1 3	1 0 =	5 0
16	32	4 6	1 6	1 6 =	7 6
18	24	5 9	2 3	2 0 =	10 0
21	18	10 0	2 6	2 6 =	15 0
24	15	12 0	3 2	3 10 =	19 0

Single junctions, sloping or square (*Fig.* 5 and 6), Tapered pipes (*Fig.* 3 and 4), bends or elbows (*Fig.* 9, 10, 11), double the price.

Double junctions (*Fig.* 7 and 8), treble the price.

Drain pipes laid in sandstone-concrete, reckon double prices for 4in. and 6in. pipes.

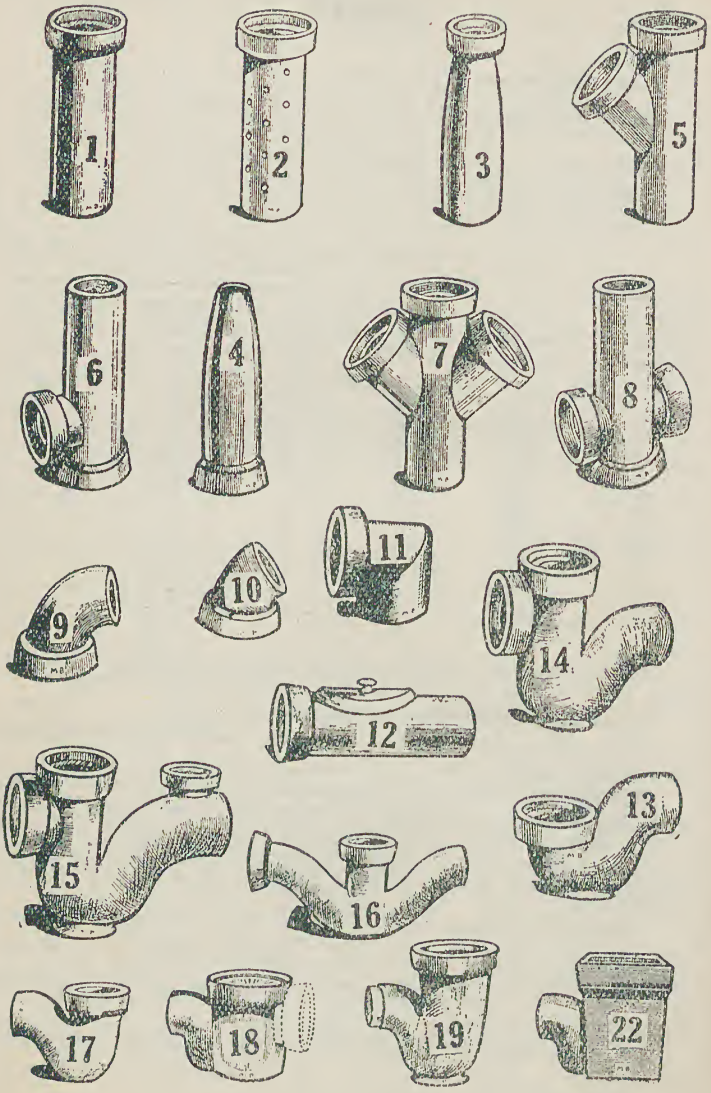
Excavation.—This item is reckoned 2ft. deep by required width including filling and ramming over pipes at 8/– per c. yd. The cost of any other depth up to about 7ft. may be seen from this: If at the same price per c. yd., 5ft. deep will be about double, and 7ft. deep about treble the price, on account of extra width at top required to lay the pipes.

Cutting for drains through sandstone rock, for pipes, add extra on above table:—4in. G.E. pipes, 1/6; 6in., 2/2; 9in., 2/6; 12in., 3/– per foot run to 2ft. deep.

12in. Brick Surface, 3 bricks side by side Drains, bedded in sand and grouted in cement, 2/– per foot run.

Brick on edge against wall and one flat, for asphalt drainage, 1/6 per ft. run.

Brick edging only, –/8 per foot run.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GLAZED EARTHENWARE DRAIN PIPES AND FITTINGS.

(*Prices Fluctuating.*)

Pipes (*Fig.* 1), prices as per preceding table, per foot run; **Bends** (*Fig.* 9 and 10); **Elbows** (*Fig.* 11); **Single Junction** (*Fig.* 5, 6); **Taper Pipes** (*Fig.* 3, 4), and **Taper Bends**, Double price of pipe.

Double Junctions (*Fig.* 7, 8), treble the price of an ordinary pipe.

FITTINGS.

	4in.	6in.	9in.	12in.
	s. d.	s. d.	s. d.	s. d.
Inspection Pipes (*Fig.* 12) ...	4 6	5 6	—	—
Bends (*Fig.* 9, 10)	5 3	6 3	—	—
Junctions (*Fig.* 5, 6)	6 0	7 0	—	—
P Traps, Plain (*Fig.* 16, 17) ...	5 0	8 6	21 0	52 6
P Traps, Inlets	6 3	10 6	31 0	—
Buchan Traps (*Fig.* 15)	10 6	17 6	37 6	85 0

Gully Traps, Plain (*Fig.* 18, 19, 22), 6in., 7/–. 8in., 8/6. 10in., 11/–. 12in., 13/–. **Inlets**, each, extra 1/–.

C.I. Grates, for Gully Traps, 4in., 1/–. 6in., 1/3. 8in., 1/9. 10in., 2/6. 12in., 3/6.

Gully Risers, 4in., 1/3; 6in., 1/9; 8in., 2/9; 10in., 3/6; **Inlets** each extra 1/–.

Sink Stones, 18in. x 18in. x 4in., each, 8/6. C.I. Grates, 1/9. **Inspection Boxes**, 3/–.

Grease Trap (*oblong*) and grate, 60/–. Grates, 5/6. (*Round*) and grate, 50/–.

Discs (*earthenware*), 4in., –/4. 6in., –/5. 9in., 1/2. 12in., 1/9. 16in., 2/9.

Perforated Pipes (*Fig.* 2), 4in., 2/9. 6in., 3/9.

Channel Pipes, 4in., –/8½. 6in., 1/–. 9in., 1/9. 12in., 2/9.

Channel Bends and Junctions, Double the price of channel pipe per ft.

U Gutter Tiles, 1 ft. long, 4in. wide, each –/6, 250, per ton, A Rates.

Reflux Sink, each, 52/6.

Agricultural Pipes, 12in. long per 100

		Weight per 1000 Tons	Cwt.
2in.	28/–...	1	9
3in.	33/–...	2	5
4in.	40/–...	3	5
6in.	50/–...	6	0

Large quantities, special quotation.

Garden edge tiles, 6in. wide, 17/6, 700 per ton. 9in. wide, 25/– per 100.
Paving Tiles, 9in. x 4½in. wide, 20/–. 12in. x 6in., 27/6 per 100.
Second quality Drain Pipes, if available, 20 per cent off list price.

GOVT. CONTRACT PRICES FOR LAYING G.E. DRAIN PIPES.

Up to	2ft. deep.	3ft. deep	4ft. deep	6ft. deep
4 inch	2/–	2/6	2/9	3/9
6 „	2/6	3/–	3/6	4/6
9 „	4/–	4/6	5/6	7/–
	In Rock or Sandstone Medium (*Average Prices*).			
4 inch	3/9	6/6	9/6	19/–
6 „	4/9	7/6	10/–	20/–
9 „	5/6	8/9	11/6	23/–

Fee for connecting to sewer, 5ft. deep, including fittings, about £5.

The rapid increase in rock below 4ft. to 6ft. is about double, owing to extra width required for elbow room in working and casting debris added. (*See Trench Table for Excavation.*)

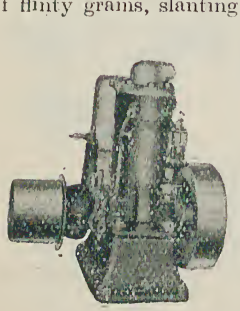
City Council's Fee for repairing or re-laying wood blocking and concrete, 23/– per square yard, using old blocks.

LABOR AND MACHINERY COST PER DAY.

Trench work with Compressed Air and Jack-hammer tools (the latter cost from £30 to £82 each).

Labor.—2 operators at 20/– and 26/– per day	£2	6	0
1 compressor operator and alternately trepid cleaner	1	3	0
Gasoline and oil for Compressor, 10/– depreciation of plant, 14/–; sharpening tools, etc., per day, net ...	1	11	0
	£5	0	0

After installing in position the above pneumatic plant, the speed of working in Sydney sandstone ranges from 50ft. x 4ft. deep x 3in. wide to 100ft. x 6ft. x 3in. wide in mild free bottom-block-Pyrmont stone in a day of 8¾ hours, according to the nature of the stone and absence of flinty grains, slanting beds, etc.



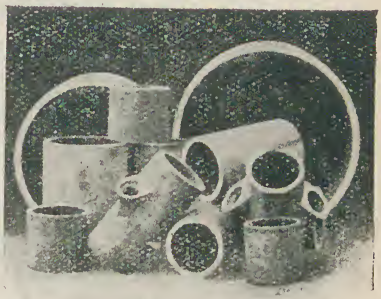
SCANDIA STATIONARY ENGINE, ½ B.H.P., FOR KEROSENE OR CRUDE OIL.

This Engine is suitable for driving winches, pumps, choppers, electric generators, saws, or planing machines. Speed regulated by Centrifugal Governor fitted direct on crank shaft, adaptable to any speed by handle lever.

The engine can be started in about half a minute's time by means of the special ignition device.

5 H.P., Price £95, upwards.

N.S.W. STATE MONIER PIPE AND CONCRETE WORKS.



CIRCULAR MONIER PIPES.

Each 3 feet 7 inches long.

Inside Diameter Pipe		Price per lin. foot in ton lots		Discharge Area	Approximate Weight per lineal foot			Approx. price per foot run laying	
ft.	ins.	s.	d.	sq. feet	cwt.	qrs.	lbs.	s.	d.
0	9	1	8	0.44	0	1	8	0	8
1	0	2	7½	0.78	0	2	3	0	10
1	6	5	0	1.77	0	3	6	1	0
1	9	7	6	2.41	1	0	2	1	2
2	0	10	0	3.14	1	0	27	1	6
2	6	14	0	4.91	1	3	0	2	0
3	0	18	0	7.07	2	0	26	2	6
3	6	23	0	9.62	2	3	17	3	0
4	0	28	0	12.57	2	3	2	4	0
4	6	33	6	15.90	4	0	25	5	3
5	0	41	0	19.64	4	3	21	6	9
5	6	48	0	23.75	5	3	13	9	0
6	0	57	0	28.27	6	3	15	10	0

EXCAVATED DRAIN TRENCH.

Example of cost of excavating Drain Trench, 6 x 1ft. 6in., 4ft. sandstone, 2ft. soil, employing choppers at 18/- per day of 6 hours; blacksmith and boy for sharps; compressed pellet blasting powder, used estimate quantity 166 cubic yards, cost £64 10s., or 7/9 per cubic yard.

Bitumen Pipe Joints. G.E. Sewerage Pipes, Melbourne City Council, have in some instances been jointed with coal tar, bitumen and blue stone dust mixture, sold in blocks at £7 per ton, by the Neuchatel Asphalt Co. 10lb. brick will do two joints of a 9in. pipe.

OVIFORM MONIER PIPES.

Each 3 feet 7 in. long.

Inside Dimensions of Pipe.	Price per lin. ft. in ton lots	Discharge Area	Approx. Weight per lin. foot.	Approx. price for laying pr. ft. run.
ft. in. ft. in.	s. d.	sq. ft.	cwt. qrs. lbs.	s. d.
1 3 x 0 10	3 9	0.81	0 2 1	0 9
1 6 x 1 1	5 3	1.24	0 2 26	0 11
1 9 x 1 4	7 0	1.77	0 3 24	1 2
2 1 x 1 6½	9 3	2.42	1 0 26	1 4
2 5 x 1 9	11 6	3.17	1 2 2	1 8
2 9 x 1 11½	14 3	4.03	1 3 7	2 3
3 3 x 2 2	17 3	5.21	2 0 17	2 9
3 6 x 2 4	20 6	6.09	2 2 25	3 6
4 0 x 3 0	28 0	9.19	3 1 2	4 9
4 3 x 3 3	30 9	10.61	3 2 20	6 6
4 6 x 3 6	33 6	12.14	4 0 10	8 9

Short Pipes.—Price per lin. foot plus 10 per cent. Junction Pipes, plus 25 per cent. Splayed Pipes, lineal foot on extreme length.

Prices delivered to rail, wharf, in city or within 5 miles of our Works, Erskineville.

Excavation and other items not included. For further information, and estimates for quantities laid complete, *see advt., p.* 16.

HUME PATENT CENTRIFUGAL PIPES.

Each Pipe 6 feet long.

Inside dia. of Pipe	Price per foot in ton lots	Discharge Area	Approx. weight per foot run.	Approx. weight per pipe	Approx. Boat tonnage per pipe
ins.	s. d.	sq. ft.	cwt. qrs. lbs.	cwt. qrs. lbs.	cubic ton
6	1 0	0.19	0 0 23	1 0 26	.054
9	1 8½	0.44	0 1 10	2 0 0	.106
12	2 8½	0.78	0 1 26	2 3 17	.173
15	4 3	1.22	0 2 25	4 1 10	.270
18	5 0	1.77	1 0 1	6 0 7	.387
21	7 6	.241	1 1 0	7 2 1	.508
24	10 0	3.14	1 2 2	9 0 13	.652

Prices at works or on rail, boat, for quotations, *see advt., p.* 16.

RICHARD TAYLOR LIMITED.

CONCRETE AND REINFORCED CONCRETE PIPES.

Net Prices per lin. foot, in 2-ton lots, delivered within five miles of works, Marrickville, Sydney.

(*Prices may fluctuate.*)

Internal Diameter	Weight per foot.	Spigot and Socket Joints. Same as G.E. Pipes. Plain Concrete 3ft. lengths	Spigot and Socket Joints. Same as G.E. Pipes. Reinforced Concrete 3ft. lengths	Butt-end Reinforced Concrete. Without Spigot & Socket Joints 3ft. lengths
	lbs.	s. d.	s. d.	s. d.
9 inch	42	1 6		
12 ,,	64	2 3		
16 ,,	90	3 10	4 2	4 0
18 ,,	116	4 4	4 9	4 6
21 ,,	140	6 5	6 11	6 9
24 ,,	160	8 3	9 0	8 9
30 ,,	195			12 6
		4ft. lengths	4ft. lengths	4ft. lengths
36 ,,	280			16 6
42 ,,	360			20 6
48 ,,	440			24 6
54 ,,				29 0
60 ,,	500			36 0
72 ,,	770			52 6

For Butt-End Reinforcing Pipes, Jointing Collars.

Wire Netting and Scrim supplied free of charge. Add for Branches, Bends, Junctions, 50 to 100 per cent.

MUNICIPAL STREET WATERING TROUGHS.

Reinforced Concrete, 8ft. x 2ft. wide x 1ft. 6in., on stand, complete, £10 13s. With dog trough under, £13 5s.

Vehicle Gutter Bridges, reinforced concrete, centre 3ft. corrugated, 2ft. x 3½in. thick, 9ft. long, £3 3s. 10ft., £3 10s. 12ft., £4 4s. 15ft., £5 5s.

WEIGHTS AND FREIGHTS, N.S.W.
G.E. Drainpipes per Rail.

3in. dia.	...	150 per ton		12 dia.	...	...	24 per ton
4 ,, ...	...	100 ,,		16 ,,	...	...	15 ,,
6 ,, ...	...	60 ,,		18 ,,	...	...	10 ,,
9 ,, ...	...	34 ,,		24 ,,	...	...	7 ,,

1 ton C Rates. Less than 15 cwt. 1st class rates.

In 5 ton lots in 4-wheel truck, B rates; 6 ton about 3/– per ton for each 10 miles.

T.C. Air Bricks.

300 per ton, 2nd class rates, about 6/6 per ton each 10 miles M rates full truck, 1/9 per ton each 10 miles.

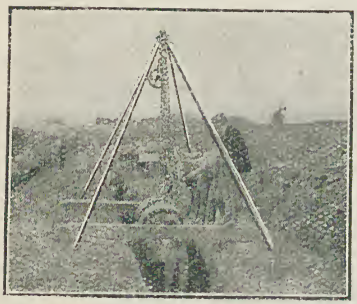
Flower, Chimney, or Earthenware Pots, B rates full trucks.

Shipping Rates N.S.W. Coast from Sydney.

About –/6 for 4in. pipes; –/9 for 6in. pipes, &c.

Or quotations for quantity per ton or bulk, insurance to be paid and arranged with insurance office by consignor.

Portable Shear-Legs. For constructional work, pipe laying, stone setting and general outdoor purposes. The following prices do not include pulley-blocks.



Pipe laying with portable tripod.

Shear legs and block during transport.

Working Load. Price per Set.

Three-Legged Shear.

Tons legs	1 £	s.	2 £	s.	3 £	s.
10ft.	10	10	12	0	13	0
12ft.	11	5	13	10	14	10
15ft.	12	5	15	0	16	5
20ft.	19	0	20	15	22	5
22ft. 6in.	21	0	22	15	24	5

Four-Legged Shear.

Tons	1 £	s.	2 £	s.	3 £	s.
10ft.	14	5	15	15	16	15
12dt.	15	5	17	10	18	15
15ft.	16	5	19	5	20	15
20ft.	23	10	26	5	28	0
22ft. 6in	27	0	29	15	31	5

The notable features of the head design, eliminating all securing bolts and pins, call for special notice. When the legs are erected it is quite impossible for the components to come apart.

Advt., p. 13.

Miners and Rock Choppers' Award, 1923, per hour.

	s.	d.
Sewer trenches at 36 hours per week	3	3
Other than sewer trenches	2	8
Sewer miners driving tunnels without explosives	5	1
Ditto, after breaking through	3	9
Driving sewer tunnels in sandstone over 40 s. ft. area face ...	2	8
Sinking shafts in sandstone under 40ft. area	3	3
Trench and shaft sinkers, over 20ft.	2	3

Drain Testing and Clearing Appliances.

Cylindrical Air-bag "Stopper," with 6ft. of air tube and cock—2in. dia., 10/–; 2½in., 11/–; 3in., 13/–; 4in., 17/–; 5in., 18/–; 6in., 19/–; 7in., 20/–; 8in., 21/–; 9in., 25/–; 10in., 28/–; 12in., 35/–; 15in., 44/–; 18in., 50/–; 21in., 70/–; 24in., 86/–; 27in., 106/– each.

Add 25 per cent. on to prices in Australia.

Air Pumps, hand, 10/– each.

Lever arm for applying interceptor stopper, 15/–.

Drain Rods, light cane, £6 to £8 per 100ft.

Drain Rods, Malacca cane, brass screw junctions with straps, per 100ft., from £8 to £12.

6in. Scrapers, 10/6; Plungers, 10/–; Archimedian Screw Cleaners, 3in., 9/–; Whalebone Drain Brushes, 4in. to 12in. dia., 25/– to 30/–.

ARTESIAN SURFACE WATER DISTRIBUTING DRAINS.

Distributing earth drains, to carry bore water from Artesian Wells over mostly black, sticky soil, or red soil of the Plains. Total cost, including equipment, from £10 to £15 per mile, or 2d. to 5d. per cubic yard, the drains containing about half a cubic yard for every running yard.

CAPACITY OF TANKS.

CIRCULAR COR. IRON.
REPUTED CAPACITY.

Diam.	Height of Tank. 4ft.	5ft.	6ft.	8ft.
ft. in.	gall.	gall.	gall.	gall.
3 3	200	250	300	400
3 6	240	300	360	480
3 9	280	350	420	560
4 0	310	390	470	620
4 4	—	—	540	720
4 6	—	—	590	787
5 0	—	—	720	960
6 0	—	—	1,050	1,400

SQUARE IRON: 2ft. 8in. sq., 100 gall.; 3ft. 3in. sq., 200 gall.; 3ft. 8in. sq., 300 gall.; 4ft. sq., 400 gall.

WATER.

1 pint pure water weighs 1¼lb.
1 gallon pure water contains 277.274 cubic ins.
1 cubic ft. distilled water, 62 deg. Fahr., weighs 62.321lbs.
1 cubic yard distilled water, 60 deg. Fahr., weighs ¾ ton.
1 cubic fathom distilled water, 62 deg. Fahr., weighs 6 tons.

NUMBER OF CUBIC YARDS IN FOUNDATION TRENCHES, CONCRETE, OR EXCAVATED WORK FOR EVERY FOOT DEEP.

Results in Cubic Yards and Decimals.

Length of trench.	WIDTH OF TRENCH.														
	inches.				feet.										
ft.	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
6	.2	.2	.3	.3	.4	.5	.7	.8	.9	1.1	1.3	1.5	1.7	2.	2.2
7	.2	.3	.4	.4	.5	.6	.8	.9	1.	1.3	1.5	1.8	2.	2.4	2.6
8	.3	.3	.4	.5	.6	.7	.9	1.	1.2	1.5	1.8	2.	2.4	2.6	3.
9	.3	.4	.5	.6	.7	.8	1.	1.2	1.3	1.6	2.	2.4	2.6	3.	3.4
10	.3	.4	.5	.6	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.4	3.7
11	.4	.5	.6	.7	.8	1.	1.2	1.4	1.6	2.	2.4	2.8	3.2	3.7	4.1
12	.4	.5	.6	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.5	4.	4.4
13	.5	.6	.7	.8	1.	1.2	1.4	1.7	1.9	2.4	2.9	3.4	3.8	4.3	4.8
14	.5	.6	.7	.9	1.	1.3	1.5	1.8	2.	2.5	3.1	3.6	4.1	4.7	5.2
15	.5	.6	.8	.9	1.1	1.4	1.7	1.9	2.2	2.7	3.3	3.9	4.4	5.	5.5
16	.6	.7	.9	1.	1.2	1.5	1.8	2.	2.3	2.9	3.5	4.1	4.7	5.3	5.9
17	.6	.7	.9	1.1	11.3	1.6	1.9	2.2	2.5	3.1	3.8	4.4	5.	5.7	6.3
18	.6	.8	1.	1.1	11.3	1.6	2.	2.3	2.6	3.3	4.	4.6	5.3	6.	6.6
19	.7	.8	1.	1.2	1.4	1.7	2.1	2.4	2.8	3.5	4.2	4.9	5.6	6.3	7.
20	.7	.9	1.1	1.3	1.5	1.8	2.2	2.6	2.9	3.7	4.4	5.2	5.9	6.6	7.4
21	.7	.9	1.1	1.3	1.5	1.9	2.3	2.6	3.1	3.9	4.5	5.3	6.2	7.	7.8
22	.8	1.	1.2	1.4	1.6	2.0	2.4	2.8	3.2	4.1	4.9	5.7	6.5	7.3	8.1
23	.8	1.	1.2	1.4	1.7	2.1	2.5	2.9	3.4	4.2	5.1	5.9	6.8	7.6	8.5
24	.8	1.1	1.3	1.5	1.8	2.2	2.6	3.	3.5	4.4	5.2	6.1	7.1	8.	8.8
25	.9	1.1	1.4	1.6	1.8	2.3	2.7	3.2	3.6	4.6	5.5	6.4	7.4	8.3	9.2
26	.9	1.2	1.5	1.6	1.9	2.4	2.9	3.3	3.8	4.8	5.8	6.7	7.7	8.6	9.6
27	1.	1.5	1.5	1.7	2.	2.5	3.	3.6	4.	5.	6.	7.	8.	9.	10.
28	1.0	1.0	1.5	1.8	2.1	2.5	3.1	3.6	4.1	5.1	6.2	7.3	8.3	9.3	10.3
29	1.0	1.3	1.6	1.8	2.1	2.6	3.2	3.7	4.3	5.3	6.4	7.5	8.5	9.6	10.7
30	1.1	1.3	1.8	1.9	2.2	2.7	3.4	3.8	4.4	5.5	6.6	7.7	8.8	10.	11.1
31	1.1	1.4	1.7	2.	2.3	2.8	3.4	4.	4.6	5.7	6.8	8.	9.2	10.3	11.5
32	1.1	1.4	1.7	2.	2.4	2.9	3.5	4.1	4.7	5.9	7.1	8.3	9.5	10.6	11.8
33	1.2	1.5	1.8	2.1	2.4	3.	3.6	4.2	4.9	6.1	7.3	8.5	9.8	11.	12.2
34	1.2	1.5	1.8	2.2	2.5	3.1	3.7	4.4	5.	6.3	7.5	8.8	10.1	11.4	12.6
35	1.3	1.6	1.9	2.2	2.6	3.2	3.9	4.5	5.1	6.5	7.8	9.	10.4	11.7	13.

NUMBER OF CUBIC YDS. IN FOUNDATION TRENCHES, &c.—*Contd.*

Results in Cubic Yards and Decimals.

Length Trench.	WIDTH OF TRENCH.														
	inches.				feet.										
ft.	12	15	18	21	2	2½	3	3½	4	5	6	7	8	9	10
36	1.3	1.6	2.0	2.3	2.6	3.3	4.	4.6	5.3	6.6	8.	9.3	10.6	12.	13.3
37	1.3	1.7	2.	2.4	2.7	3.4	4.1	4.8	5.5	6.8	8.2	9.6	10.9	12.3	13.7
38	1.4	1.7	2.1	2.4	2.8	3.5	4.2	4.9	5.6	7.	8.4	9.8	11.2	12.6	14.
39	1.4	1.8	2.1	2.5	2.8	3.6	4.3	5.	5.8	7.2	8.6	10.	11.5	13.	14.4
40	1.4	1.8	2.2	2.5	2.9	3.7	4.4	5.1	5.9	7.4	8.8	10.3	11.8	13.3	14.8
41	1.5	1.9	2.2	2.6	3.	3.8	4.5	5.3	6.1	7.6	9.	10.6	12.1	13.6	15.2
42	1.5	1.9	2.3	2.7	3.1	3.9	4.6	5.4	6.2	7.7	9.3	10.8	12.4	14.	15.5
43	1.6	1.9	2.3	2.7	3.1	3.9	4.7	5.5	6.3	7.9	9.5	11.1	12.7	14.3	15.9
44	1.6	2.	2.4	2.8	3.2	4.	4.8	5.6	6.5	8.1	9.7	11.3	13.	14.6	16.2
45	1.6	2.1	2.5	2.9	3.3	4.1	4.9	5.8	6.7	8.3	9.9	11.6	13.3	15.	16.6
46	1.7	2.1	2.6	2.9	3.4	4.2	5.1	5.9	6.8	8.5	10.2	11.9	13.6	15.3	17.
47	1.7	2.1	2.6	3.0	3.4	4.3	5.2	6.0	7.0	8.7	10.4	12.1	13.9	15.6	17.4
48	1.8	2.2	2.7	3.1	3.5	4.5	5.3	6.2	7.1	8.9	10.6	12.4	14.2	16.	17.8
49	1.8	2.2	2.7	3.1	3.5	4.5	5.4	6.3	7.3	9.1	10.8	12.7	14.5	16.3	18.1
50	1.8	2.3	2.7	3.2	3.6	4.6	5.5	6.4	7.4	9.2	11.1	12.9	14.8	16.6	18.4
51	1.9	2.3	2.8	3.2	3.7	4.7	5.6	6.5	7.6	9.3	11.3	13.1	15.1	17.	18.8
52	1.9	2.4	2.8	3.3	3.8	4.8	5.7	6.7	7.7	9.6	11.5	13.4	15.4	17.3	19.2
53	1.9	2.4	2.9	3.4	3.9	4.9	5.9	6.8	7.9	9.8	11.7	13.7	15.7	17.6	19.6
54	2.	2.5	3.	3.5	4.	5.	6.	7.	8.	10.	12.	14.	16.	18.	20.
55	2.	2.5	3.	3.5	4.1	5.1	6.1	7.1	8.2	10.2	12.2	14.3	16.3	18.3	20.4
56	2.	2.6	3.1	3.6	4.1	5.2	6.2	7.2	8.3	10.4	12.4	14.5	16.6	18.6	20.7
57	2.1	2.6	3.2	3.7	4.2	5.3	6.3	7.4	8.5	10.6	12.6	14.8	16.9	19.	21.1
58	2.1	2.7	3.2	3.7	4.3	5.4	6.5	7.5	8.6	10.7	12.8	15.	17.1	19.3	21.5
59	2.2	2.7	3.2	3.8	4.3	5.5	6.5	7.6	8.8	10.9	13.	15.3	17.4	19.6	21.9
60	2.2	2.7	3.3	3.8	4.4	5.5	6.6	7.7	8.9	11.1	13.3	15.5	17.7	20.	22.2
61	2.3	2.8	3.3	3.9	4.5	5.6	6.7	7.9	9.1	11.3	13.5	15.8	18.	20.3	22.6
62	2.3	2.8	3.4	4.	4.6	5.7	6.9	8.	9.2	11.5	13.7	16.	18.3	20.6	22.9
63	2.3	2.9	3.5	4.	4.6	5.8	7.	8.1	9.3	11.6	13.9	16.3	18.6	21.	23.3
64	2.4	3.9	3.5	4.1	4.7	5.9	7.1	8.2	9.5	11.8	14.2	16.5	18.9	21.3	23.6
65	2.4	3.	3.6	4.2	4.8	6.	7.2	8.4	9.6	12.	14.4	16.8	19.2	21.6	24.
70	2.6	3.2	3.8	4.4	5.2	6.5	7.8	9.	10.2	13.1	15.6	18.	20.8	23.4	26.
80	2.8	3.6	4.4	5.	5.8	7.4	8.8	10.2	11.8	14.8	17.6	20.6	23.6	26.6	29.6
90	3.2	4.2	5.0	5.8	6.6	8.2	9.8	11.6	13.4	16.6	19.8	23.2	26.6	30.	33.2
100	3.6	4.6	5.4	6.4	7.2	9.2	11.	12.8	14.8	18.4	22.2	25.8	29.6	33.2	36.8
200	7.2	9.2	10.8	12.8	14.4	18.4	22.	25.6	29.6	36.8	44.4	51.6	59.2	66.4	73.6

EXCAVATOR'S WORK.

Per cubic yard, including hand plant, explosives, etc.

Wages, 2/3 per hour.

	s.	d.
1. Sand or loose soil, shovel work (getting and casting only) ...	1	6
2. Hard ditto, or loam pick and shovel work, ditto	1	9
3. Wet Mud, sand, or silt, getting and casting	2	0
4. Getting and casting, or filling into drays, earth, &c., not more than 3 feet deep, *pick and shovel work*	2	6
5. Ditto, from 6 to 12 feet deep, ditto	4	0
6. Ditto, from 12 to 18 feet deep, ditto	7	0
If in stiff clay or hard gravel, add to items 4 and 5 ...	0	9
If in soft rock or loose boulders, add ditto	2	0
If in hard sandstone or shale, add ditto	3	0
If in compact bluestone or trap, add ditto	6	0
If in compact granite, gneiss, or sienite, add ditto	10	0
If wheeled one *run* of 20 yards, add	9	0
Ditto for every additional *run*, add	0	5

N.B.—If the excavation is from the face of an open cutting, the cost will be the same as if not more than 6 feet deep as per 4th item. This work is facilitated by partly undermining and then wedging down with iron bars or explosives used.

Items 5 and 6 are only used when the earth is raised to the surface in lifts, as in cellars or basements, gasholders, &c. If these holes are large enough, the best way is to cart the stuff by a spiral road, gradually descending towards the bottom and then raise the earth, &c., forming the temporary road, by lifts or barrows with planks.

In excavating for covered Reservoirs on hills, the gullets, or tunnels, required for the inlet and outlet pipes may be used as inclines for the removal of the earth, shale, &c., from the side of Reservoir and afterwards for carting the materials, &c., required for the lining, into the Reservoir.

The prices for excavating include the used of hand plant on a small scale, but if expensive plant has to be bought for one contract only, it would not pay at these prices.

HAND LABOR EXCAVATION PRICES GENERALIZED, Cubic Yard.

	s.	d.
Excavation in Earth, including wheeling 30 yards, spreading, levelling, filling in and ramming	4	0
Ditto, trenches, ditto, in trenches 2ft. to 4ft. wide	5	0
Excavation in Sandstone, including wheeling, 35 yds.	17	0
Ditto, ditto, with blasting	12	6
Ditto, ditto, large areas and good face	10	0
Channelling in Sandstone, per foot super., wages 3/- per hour (*Machine Channelling or Guttering.—See Quarrying.*)	2	6
Levelling and scabling in Sandstone, bottom of trenches, per foot super	1	0

Reservoir dams from "Molesworth."—Width at top in low dams should be equal to the height. Breast or inside slopes, 3 to 1; back slopes, 2 to 1. Height above surface of water not less than 3½ feet.

Getting and raising coal (thick seams), per ton, from 5/- to 9/-.

(Machine Undercutters not used.)

EXCAVATOR.

Foundation trenches should be kept separate and estimated apart from other building excavation. Take the full length and width of bottom footings; multiply by the depth from surface. By reference to Table, the cubic contents of length and width by one foot deep can be ascertained at a glance. Then multiply by the depth required.

This Table is also useful in finding capacity for square tanks, sinking, or other excavation, by multiplying and adding.

SOLID OR CUBIC MEASURE.

1,728 cubic inches	...	...	...	...	...	=	1 cubic foot
27 cubic feet	...	...	...	...	...	=	1 cubic yard

WEIGHT OF EARTHS AND ROCKS.

Per Cubic Yard.

	cwt.		cwt.
1 cub. yd. Earth weighs ...	26	1 cub. yd. Sandstone weighs	36
1 ,, Sand weighs ...	30	1 ,, Marl, Clay or Shale	38
1 ,, Ironstone Gravel	36	1 ,, Quartz	41
1 ,, Quartz Gravel ...	30	1 ,, Trachyte ...	43
1 ,, Clay	31	1 ,, Granite	43
1 ,, Mud, wet ...	35	1 ,, Slate	44

A FAIR DAY'S WORK FOR A NAVVY—8 HOURS.

Pick and Shovel work:—3 to 5 cubic yards stiff soils; 7 to 10 cubic yards ordinary loams; 10 to 16 cubic yards sandy soils.

An ordinary tip cart, empty, weighs 10cwt., and holds about 23 cubic feet loose shale, or 12 cubic feet in the solid; thus taking 2¼ loads to the cubic yard in the solid; usual filling about 5 loads to 2 cubic yards solid.

Ten navvy barrow loads to the cubic yard.

INCREASE OF EARTH WHEN EXCAVATED.

Rock or shale increases in bulk from the solid about double; therefore, to obtain the price for leading per cubic yard in cutting, reckon about 2¼ times the above prices.

For hard clay, loam, gravel, conglomerate, and similar dense materials, reckon 1¾ times the above prices.

If miners trucks on rails are used, there will be a saving in the loading, because of the less height the stuff has to be lifted. If the leads are short, say less than 4 chains, barrowing with planks will be still cheaper, the height of the barrows being even lower than the miners' trucks.

THE NATURAL ANGLE OF REST FOR MATERIAL EXCAVATED.

Dry Sand, Sheltered	22 degrees	Clay	45 degrees
Wet Sand	38 ,,	Rubble or Mine Tips	45 ,,
Earth or Soil ...	30 ,,	River Shingle ...	40 ,,

CARTAGE PER ONE-HORSE LOAD.

Labor 2/–. Horse, dray, and driver, 3/3 per hour.

	s.	d.
Carting, tipping, and levelling, *lead* not more than quarter mile, per cubic yard	1	6
Ditto, from quarter to half mile *lead*, ditto	2	6
Add for every extra half mile ditto ditto	1	6
Filling earth spoil, carting 1½ miles and tipping, per load	5	0
Ditto, white hard metal in spawls, loaded and delivered 3 miles along metalled road	8	0

Ordinary single horse drays contain about 18 bushels, or 23 cubic feet.

RAILWAY AND EXTENSIVE WORKS.

In the following Tables on Excavation, the earth, rock, etc., excavated are reckoned in *situ*, *i.e.*, in its undisturbed and natural state.

Cuttings and Embankments.—In equalising the contents of cuttings and embankments for roads, railways, &c., it is not usual to make any allowance for the increased bulk of loose material, except in increasing the height of the embankments for settlement, the extent of which will depend upon the material, rock settling down the least and wet clay the most; it is always considered favorable to the contractor to pay him for embankments, if he has taken the work by the cubic yard.

Proportion of getters, fillers, and wheelers, for run of 40 yards.

HAND WORK NOT ASSISTED BY MACHINES.

	Getters.	Fillers.	Wheelers.
In loam, earth, sand, gravel, clay, &c.	1	1	1
Hard earth, or gravel, marl, &c.	1	2	2
Hard clay, loose shale, &c. ...	1	1¼	1¼
Rock, if blasted, or broken up, from	3	1	1

MEASUREMENT OF EARTHWORK.

In the measurement of cuttings and embankments with slopes, the common system of average heights gives less, and the common system of average areas gives more than the true contents; the proper system is by the *prismoidal formula*, from which the annexed table for the measurement of earthwork is calculated, but even in this case the cross section is presumed to be perfectly level, the slopes to be quite true, and the change from chain to chain regular and gradual, otherwise the measurement is incorrect.

To show the necessity of correctly ascertaining the cubical contents of earth-work, where the contractor tenders for a *lump* sum, I have taken the following from M'Neil's Earthwork Tables, which are calculated from the *prismoidal formula*:—

"In calculating the contents of embankments and cuttings in a section, the true content of which is 332,390 cubic yards, by the common methods of mean heights is only 310,652 cubic yards, thus making 21,738 cubic yards less than the true content; by the common method of mean areas the error in excess will be 43,487 cubic yards."

Extract from S.M. Herald, Nov., 1925.

In the construction of City Railway 10 years ago, 2,000 men and 400 tip carts would have been employed, but with the modern machinery 300 men and 30 motor-lorries are employed.

With the Steam Shovel, Dragline, Clam-shell Excavator, varied Loading Devices, Tractors and Speedy Transport, &c., the construction of extensive works have eliminated 75 per cent. of the human labor (*directly*), but the cost of works have not altered in the same proportion.

CONSTANTS FOR ESTIMATING.

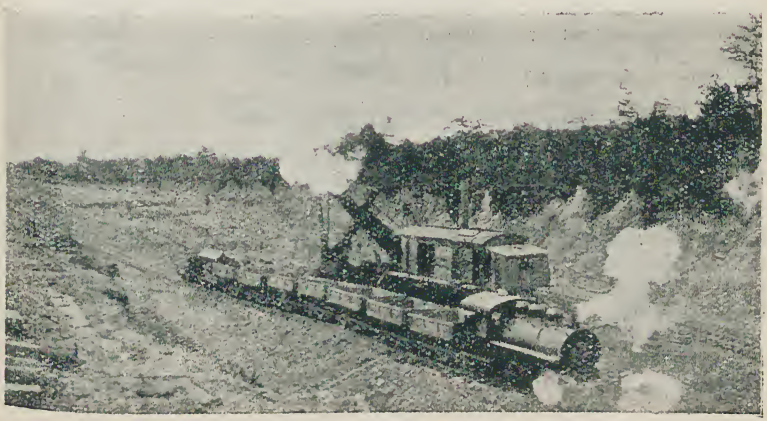
Frismoidal Formula.—Average area equal to four times the middle area added to the sum of the end areas and divided by six. In using the following constants instead of dividing the sum of the areas by six, multiply them by the following constants for the length required in chains :—

Cuttings and Embankments.

Sum of areas in feet	multiplied	by	0.204	—cubic yards in		$\frac{1}{2}$	chain
,,	,,	,,	0.408	,,	,,	1	,,
,,	,,	,,	0.612	,,	,,	$1\frac{1}{2}$	,,
,,	,,	,,	0.815	,,	,,	2	,,
,,	,,	,,	1.223	,,	,,	3	,,
,,	,,	,,	1.630	,,	,,	4	,,
,,	,,	,,	2.037	,,	,,	5	,,
,,	,,	,,	2.445	,,	,,	6	,,

The ends of cuttings on sidelong ground always form a pyramid, for which multiply the area of the base by one-third the length.

In light or shallow cuttings and embankments for railways, roads or tramways, the common average area will be sufficiently near for tendering, as it gives an excess in measurement in proportion to the inequalities of the heights. If the heights are given at every chain, " Bidder's Tables " will give the readiest and most correct measurements to the nearest foot in height, if the cross section of ground is tolerably level.



Loading Earth into Railway Dumping Trucks with Steam Shovel.

EARTHWORK, ROCK, etc., at per Cubic Yard.

Standard Table.

Reckon extra for existing wages.

EXCAVATORS AT 1s., HORSE, DRAY AND DRIVER AT 1s. 6D. PER HOUR.

Lead in yds.	Light Soil.	Loam.	Heavy Soil.	Stiff. Clay.	Shale.	Hard Rock.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
33	1 0	1 2	1 3	1 6	3 2	5 0
67	1 1	1 3	1 4	1 7	3 4	5 2
100	1 2	1 4	1 5	1 8	3 6	5 3
150	1 3	1 5	1 7	1 10	3 8	5 5
200	1 4	1 6	1 8	1 11	3 10	5 7
250	1 5	1 7	1 9	2 0	4 0	5 8
300	1 6	1 8	1 10	2 1	4 2	5 10
350	1 7	1 9	1 11	2 2	4 4	6 0
400	1 8	1 10	2 0	2 3	4 6	6 2
450	1 9	1 11	2 1	2 4	4 8	6 4
500	1 10	2 0	2 2	2 6	4 10	6 6
600	2 0	2 2	2 4	2 8	5 2	6 10
700	2 2	2 4	2 6	2 10	5 6	7 2
½ mile	2 6	2 8	2 9	3 2	6 2	7 6
1,000	2 7	2 9	3 0	3 4	6 6	7 9
1,200	3 2	3 3	3 4	3 8	6 10	8 1
1,500	3 8	3 9	3 10	4 3	7 4	8 8
1 mile	4 2	4 3	4 4	4 9	8 0	9 2
1¼ ,,	4 8	4 10	5 0	5 7	8 9	10 0
1½ ,,	5 4	5 6	5 8	6 4	9 6	10 10
1¾ ,,	6 0	6 2	6 4	7 0	10 3	11 8
2 ,,	6 10	7 0	7 2	7 8	11 0	12 6
2¼ ,,	7 8	7 10	8 0	8 4	11 9	13 4

CONSTANTS FOR ESTIMATING.

1927, Present Wages, Reckon Double.

N.B.—The first two or three items to be removed by wheelbarrows. The whole is an open cutting, the shale and hard rock including explosives.

The Average Weight of Sandstone is about 15 cubic feet per ton in place, or 36cwt. per cubic yard, and as it increases about four-fifths in bulk in removal, a solid cubic yard will be about two single horse loads. In bluestone, granite, or marble it will be about two tons, or fully two loads.

A barrow load will be about two cubic feet, or 12 shovels of No. 5 size.

SURFACE WORK.

PER SUPERFICIAL YARD, INCLUDING TOOLS. Etc.

Wages, 2s. per hour.

	s. d.	s. d.
Levelling made earth not more than one foot deep ...		0 4
Surface forming for roads not more than 9 inches deep, in earth, hard clay, &c.	0 6 to	0 8
Ditto do. in rock	1 6 to	2 0
Soiling slopes of embankments and cuttings	0 8 to	1 0

TURFING.

Turfing, removing, and re-laying grass turf	2 0 to	2 10
Getting and carting sods, 1 mile	1 2 to	1 6

RAILRAOD CONSTRUCTION SYSTEM USED ACROSS AUSTRALIA.

This system does away with depots. The materials on the construction trains are run out direct to the rail-head, the sleepers and rails are carried along by automatic process to the spot where they are to rest. The track-laying machine forms part of the train at the leading end, the locomotive at the rear end pushing the train along as the rails are laid.

The track-layer is operated by a vertical stationary engine, the steam is provided through a pipe from the locomotive. Conveying apparatus is attached to each side of the train for its whole length, in the form of a trough with rollers along the bottom. These rollers are operated by the track-laying engine and produce practically the same effect as an endless belt. Sleepers are conveyed along one side of the train, while on the other side the rails are carried. The track-laying machine itself has two jibs projecting in front, the longer one being used for sleepers, and the shorter one for the rails.

Sleepers are taken from the longer jib and laid on the formation, a rope being stretched along the formation to indicate the exact position of the ends of the sleepers. Thirteen sleepers are laid to each rail length, and while these are being placed in position navvies are engaged in getting out the rails and preparing to drop them on the sleepers as soon as the latter are laid. The small section is then secured, the train moves on 33ft., and the same process is repeated. The first trans-Australian line was constructed in 1914.

EXCAVATION TIMBERING.

Oregon at 25/- per 100. Labor, 2/3 per hour.

Timbering to open drains, 8ft. deep x 2ft. 6in. wide, repeated use of timber. Add 1/6 to 3/- per cubic yard on excavation.

Close walling and staying trenches, rough planking and labor, both sides, 2ft. 6in. x 5ft. deep, 1/6 per foot run; 2ft. 0in. x 8ft. deep, 2/6 per foot run. Over 2ft. 6in., up to 4ft. wide, add quarter more for strutting.

Galvanised corrugated iron sheets, with cross rails, preferred in some instances. If timbering is used in made ground, reckon for pointing boards, driving and staying, from 3/- to 5/- per yard super. For centering.—*See* **Carpenter** for timbering, and below for patent, corrugated, sheeting.

PLOUGH AND SCOOP WORK.

A plough, with four horses or six bullocks and two men at 90/- per day, will loosen from 200 cubic yards at a cost of 5½d. per cubic yard.

Two horses drawing a ½ cubic yard scoop at per day will remove 54 cubic yards generally, depositing earth 50 feet, at about 9d. per cubic yard, ploughing and scooping, 1/2½ per cubic yard of **earth**, it all depends upon the distance earth is deposited.

For instance :—**A square tank** in hard black soil of the plains, 80 feet square at the top, 40ft. square at bottom, battered sides, 10 feet deep, containing 14.00 cubic yards, cost £100 or about 1/5 per yard.

Another tank, soil 120 feet x 12 feet deep, 60 feet bottom, 48 feet battered sides, slopes 1ft. in 1ft., containing 2,200 cubic yards ; 6 bullocks, with plough and scoop, going through the hole backward and forwards, and depositing soil each end on bank, 10 yards from edge, cost £150, or about 1/4½ per cubic yard net.

PLOUGHS, SCOOPS AND SCRAPERS.

3-wheel Scoops.—Are great labour-savers for hauls not exceeding 5 chains. Said to be 20 per cent. cheaper than tip carts for removing Cost from, 9 cubic ft., £18 ; 24 cubic ft., £25 each.

Heavy Road and Tank-making Ploughs, from £18.

Drag Scoops for short hauls.—Improved Skid Scoops, 2ft. wide, £10 to 4ft., £16 ; with bars or chains.

Little Giant Wheel Scraper, or two Sarven wheels, 31in. diameter, £18. This scoop lifts clear of ground. For rough tracks ; for pair of horses.

Solid Steel Drag Scraper, 7 cubic ft., £5 ; 5 cubic ft., £4 10s. ; and 3½ cubic ft., £4. Weight, 100 to 80 lbs.

See Grading Machines—Roads.

Ploughing up surface of ground.

Reckoned at 20s. per acre,
is equal to 1½d. per rod, or .05d. per sup. yard ; at 40s. per acre, equal to 3d. per rod, or ½d. per cubic yard.
Different rates for ploughing per acre can be reckoned in proportion.

TO MEASURE EXCAVATED TANK.

To ascertain the contents of a tank with sloping sides, add the superficial area in feet at the top to that at the bottom, and four times half-way down batter. Divide by 6 and multiply by the depth ; result = the cubic contents in feet, multiply this by 6¼ to find the number of gallons tank would hold.

Special Excavation, as under, cost :—A Curved Trench, 20 feet radius, with plumb picked sides, sunk in hard shale, containing ironstone bands for water-main pipe—

7ft. x 6ft. x 8ft. deep = 336 cubic feet = 12½ cubic yards, actual cost, 10/- per cubic yard.

8ft. x 6ft. x 5ft., straight, cost 7/- per cubic yard.

Filling in above, and ramming in 6in. layers, 3/- per cubic yard.

For Stone Excavation—*see* **Mason and Quarrying.**

Wages, 2/6 per hour.

SINKING TANKS, WELLS, OR SHAFTS.

Per cutic yard, including tools, tackle, and powder.

Wages of Well-Digger, 2/3 per hour.

	s. d.		s. d.
Excavation for wells or small tanks or shafts, not more than 20 feet deep, light ground	3 6	to	5 0
Ditto in stiff clay or hard gravel	4 6	to	7 0
Ditto in sandstone, hard rock, or shale	18 0	to	27 0
Ditto in bluestone or other trap-rock	36 0	to	4 0
From 20 to 50 feet deep, add one-third.			
From 40 to 70 feet deep, add two-thirds.			
From 70 to 100 feet deep, reckon double.			
Guttering in coal shale or soft shale, per super. ft. ...	0 10	to	1 0
Guttering in sandstone, per super. foot...	2 6	to	3 0
Ditto in bluestone or granite, do.	5 0	to	7 0

N.B.—In the third and fourth items, take the least price for the largest, and the greatest for the smallest wells, on account of the difficulty of working and blasting rock in confined areas.

If blasted with explosives, one side of the tank or well must be kept above the other, to give a face and render the blasts effective. *See* Quarrying.

Guttering.—In rock excavation, where any portion of sides are required to be left even or picked, a groove or gutter must be kept in advance of the main excavation to prevent injury to sides by blasting.

Gutterers, or Rock-choppers' wages, 24/– per day of 6 hours.

See Plant for Guttering Machines.

MINING.

SEWER TUNNELLING AND SHAFT SINKING.

Per lineal foot (all found).

Drive 4 x 3 for sewer, Sydney sandstone	24/–	to	32/–
Drive 7 x 7 in Sydney sandstone	40/–	to	54/–
Drive 6 x 3 in hard, compact rock (trachyte) ...	50/–	to	60/–
Ditto in clay or soft shale	20/–	to	30/–

RAILWAY TUNNELS.

Railway Tunnel.—If the rock is self-supporting, after reckoning the cost of guttering both sides and top, the *core* may be removed at about double the cost of similar rock in open cutting, but when timbering is required for subsequent lining, the cost is uncertain.

Per cubic yard.	Without guttering.	With guttering.
Tunnel, 20 x 15, sectional area 30 super. yards, curved all round through hard bluestone rock	30/–	48/–
Ditto, ditto, through granite, &c.	42/–	72/–
Ditto, through soft clay, slate, or shale	21/–	37/6

Confined space quarrying, no explosives used :—Sinking circular tank in sandstone rock—10 feet 6in. diam. x 13 feet deep = 42½ cubic yards ; including scappling, sides and bottom :—One man, 500 hours at 2/– £50 ; about 23/6 per cubic yard.

Reckon for existing wages.

MINING IN FELSITE (BURRAGORANG) FOR SILVER LEAD ORE.

Including Haulage and Explosives.

Miner's Wages, 17/6 per day; Trucker's, 15/2.

1924	Cost per foot deep.
Sinking shaft on underlay, 30 degrees incline, "Felsite," with horse-whip and ½-ton trucks, to 300 feet from surface, 9 x 6; good holding ground, "stull" posts only	£3 10 0
Ditto, to 300 feet, vertical shaft, plain	4 0 0
Ditto, to 300 feet, with "stull" posts only	4 10 0
Ditto, to 400 feet, steam haulage, 12 x 8 shaft, close timbering	4 10 0
Sinking shaft, 12 x 8, to 600ft., by hand drilling, "Felsite"	6 0 0
Ditto, with steam winding gear and air compressed rock drill, at 600 feet, 12ft.x 8ft. shaft, good holding ground, "stull" posts only, average about	5 10 0
Driving levels, 7ft. x 7ft. 6in.	3 0 0
Driving levels, 6ft. x 6ft.	2 15 0
These items include laying rails and timbering, but not management, or the erection of buildings on the surface. The hand labor for shaft includes erection or engine and boiler	
Prospecting Tunnel in Felsite, fall from face to outlet, 200 feet x 6 feet x 4 feet (trucks and rails found) ...	20/– to 30/–
Driving tunnel, 9 feet x 6 feet, fall from face to outlet, up to 300 feet, full cost	2 10 0

MINING SHAFTS.

Double Shaftsinking.—Shaft 10 feet by 4 feet wide, timbered with 9 x 3 H.W., with two cage and one ladder compartments, each about 3ft. 6in. x 3ft., with two 9 x 3 centres, the two centres and two ends to be let into grooves cut into the sides or wall plates, mitre fashion, so as not to weaken the timber. An opening of two inches is generally left at every fifth set, so as to get in a stage board for repairs. The centres fit close and ensure good ventilation, even for a shaft 2000 feet deep, giving an *upcast* and a *downcast* current.

The ladders are inclined with a stage and manhole, not more than 30 feet apart. *See Mines Act.* A shaft as above, with machinery, pumping gear, fuels, &c., will cost about £20 per foot in depth.

Tanks.—Unless there is a face or side obtained in sinking tanks or shafts in rocks, the explosive used will have little effect. It is therefore usual to keep one side of the tank or hole at least two feet above the other, where practicable. This remark also applies to drives or tunnels.

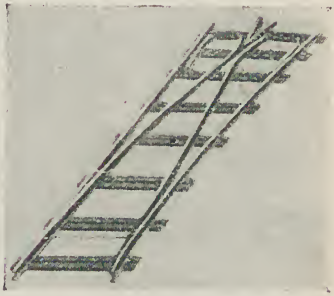
Large open excavations in sandstone cost from 6/– to 15/– per cubic yard.

Wages Award.—Operator, 2/3 machine (compressed air) drills

Machine (compressed air) drills have revolutionized this work. Successive holes, 1½in. diameter, drilled 6 to 9in. apart in a line where cleavage is to be made. Speed from 30 to 40 feet drilling per hour, in 4 feet holes—15 to 20 feet deep—in one length.

PORTABLE STEEL TRAMWAYS.

TRAMWAYS FOR CONTRACTORS AND MINERS.



PERMANENT LIGHT STEEL TRAMWAY.

Standard Sizes of Tee Section Rails Stocked.

STEEL TRAMWAY RAILS.

Per yard. lbs.	Lengths. feet.	Depth. feet.	Head. inch.	Bottom. inch	Price Approx.
14	12 to 16.6	$2\frac{1}{4}$	$1\frac{3}{32}$	$2\frac{1}{16}$	
20	18 to 30	$2\frac{9}{16}$	$1\frac{3}{8}$	$2\frac{3}{8}$	£17 per ton
*30	18 to 30	3	$1\frac{5}{8}$	$2\frac{7}{8}$	
45	18 to 30	$3\frac{11}{16}$	2	$3\frac{11}{16}$	
60	30 to 40	$4\frac{1}{2}$	$2\frac{1}{2}$	$4\frac{1}{4}$	£13 10s.
80	30 to 40	$5\frac{1}{16}$	$2\frac{5}{8}$	5	

*Suitable for locomotive work.

By adhering to the above standard sections, renewals of the same section and length may always be obtained from stock.

Fishplates, Bolts and Nuts are supplied with the Rails.

Spares can always be supplied from stock.

Dogspikes for fastening the above Rail to Timber Sleepers, from £1/15/– per cwt. (approximate) f.o.r. or f.o.b., Sydney.

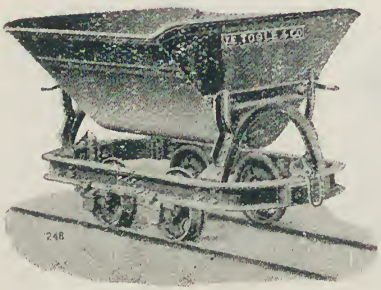
Switches or Turnouts with steel sleepers attached, for light sections, per set, £9 to £11 /10/–.

STEEL TIPPING KIBBLES OR BUCKETS, $\frac{3}{16}$in. plate.

18 cub. ft. capacity, each £20.
23 cub. ft. capacity, each £23.

STANDARD STEEL TIP TRUCKS.

Heavy Pattern Steel Double Side Tip Trucks with improved roller bearings, automatic self-locking fastener, and bulb-iron rims are stocked in Sydney, as follows :—



Standard Trucks with Plain Body.

Capacity ½ c. yd., gauge 24in. approx. price each, £15/10/–.

,, ¾ c. yd., gauge 24in. approx. price each, £16.

,, 1 c. yd., gauge 24in. approx. price each, £16/10/–.

Double End Tip Trucks of same construction as above, but arranged for end instead of side tips, £2/10/– extra.

All prices include delivery f.o.r. or f.o.b. Sydney.

Tramway Specialists, see advt., p. 13 & 19.

DOUBLE ACTING STEAM PILE-DRIVING HAMMER.

For driving sheet piling up to 18 feet long, excavation, timbering, or sinking round piles, 9ins. to 20ins. diameter, up to 60ft. long.

The weight of hammer is always resting on top of pile during the blows delivered, from 150 to 200 per minute, as desired.

Price delivered on rail, up to £300. *See Agent's advt.*, p. 19.

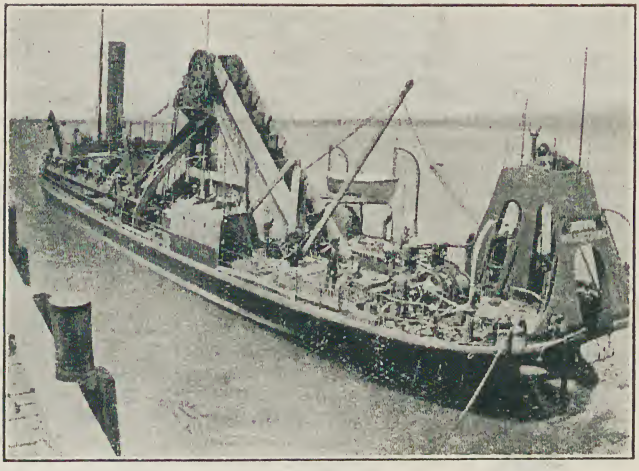
Short Stroke Steam Hammer, fitted with pile pulling attachment, so that hammer can be used for either driving or pulling piles. Short rate, 150 blows per minute. Minimum stroke, 16 inches.

Long Stroke Hammer, minimum stroke, 24 inches. Rate 110 strokes per minute. Short stroke, 6,000 ft. lbs. ; Long Stroke, 9,650 ft. lbs. Price : Long Stroke, £450 ; Short Stroke, £400 ; Pulling Attachment, £60.

IMPROVED PILE CAP.

A new self-contained Pile Cap for these Steam Hammers that will eliminate the use of the loose striking plate.

The new Pile Cap is a loose steel cap casting retained in the base of the hammer. It has a conical space on its under side to fit the head of the pile which is merely trimmed to fit into this conical depression. The hammer rests correctly on the pile for the hammer.



DREDGING.

Excavating by Ladder Dredge.

HARBOURS AND RIVERS.

Government Works Department Report.

	Per ton.
300 days run of 8 hours, " Newcastle " dredge, sand to 26ft. level, and discharging at sea, 10 miles, cost	3.16d.
At Newcastle, per dredge " Glaucus," sand to 26ft. level, 394,440 tons, dredging alone	1½d.
Including discharging at sea	2¼d.

Sand on rough rock bottom, costing from 9d. to 1/- per ton.

SUCTION PUMP DREDGING.

	Per ton.
Suction Pump Dredge at Byron Bay, sand and shingle ...	4.26d.
Suction Pump Dredge " Jupiter," sand, mud and shingle, 128,331 tons sand, clay, shell, mud and stone ...	4.11d.

Alluvial dredging, Araluen G.D. Co., from two ladder dredge, old river bed :—

20ft. above and 25ft. below water, average 55,000 c. yards, cost £80 ; 18ft. above and 28ft. below water, average 11,000 c. yards, cost £80. ¼d. to 1¾d. per c. yard.

The cost of dredging and towing out to sea five miles, varies from 3d. to 10d. per ton, according to material excavated.

GRAB DREDGES.

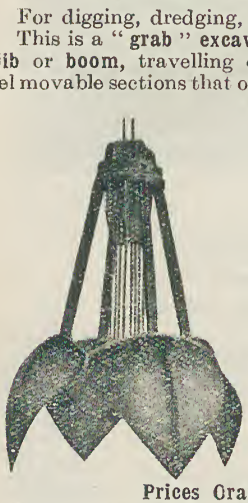
Priestman Bros.' grab is a very effective excavating machine, like a steam crane, but is also specially designed for passing under low bridges, through narrow canal locks, &c.

Cost of working.—The Sydney Harbour Board has dredged heavy silt at 1¾d. per ton, which used to cost 5d. per ton when raised by the large Steam Ladder Dredger, and another Harbour Board has done for 3d., dredging which used to cost 8d. per ton, and, they state, with more hopper accommodation, their work could be done for 1½d. per ton. A railway contractor who was paying 6d. for excavating bridge foundations, subsequently did the same for less than 2d. with one of the above machines.

HAYWARD'S AUTOMATIC GRAB BUCKETS.

For digging, dredging, and re-handling.

This is a "**grab**" **excavator,** operated by wire ropes at the end of a **jib** or **boom,** travelling cable way or electric hoist, and contains steel movable sections that open and close on the material to be removed.



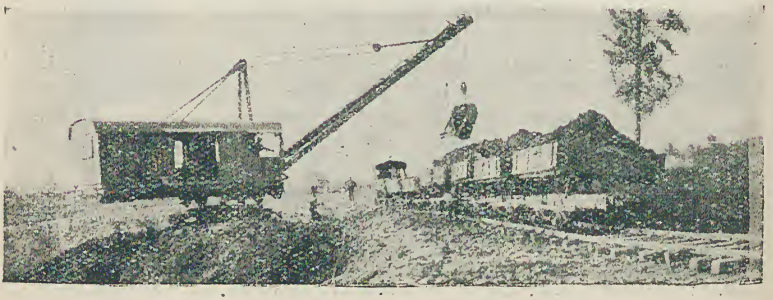
The **Orange Peel** pattern bucket excavator is made in three and four sections, according to capacity of bucket, with the digging points of manganese steel, shaped like a small plow (*see illustration*), which meets with less resistance, like a pointed shovel, compares with the square mouth shovel.

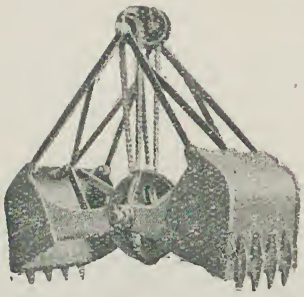
One cubic yard capacity bucket orange peel averaged 400 cubic yards every 10 hours in uncemented gravel and sand.

Being circular, it is suitable for working inside round spaces, sinking **cassions** and **bridge** columns.

Prices Orange Peel pattern Bucket.

9 cubic feet capacity, £240. 1 cubic yard, £350.





Clam Shell pattern Buckets, single chain, 4 cubic feet, £90 ; 82 cubic feet capacity, £250.

For further information, *see agent's advt.*, page 19.

The **Clam Shell** pattern bucket excavator is suitable for transferring sand, crushed stone or gravel from truck or "dump." A one cubic yard bucket is said to transfer 400 to 500 cubic yards in 10 hours.

The **Drag Scraper** pattern bucket, as its name indicates, can be closed at will from the operating machine, and does not have to be dragged *home* every trip.

A one cubic yard drag scraper excavator shifted, on an average, 200 cubic yards of "Hard-pan" in 10 hours, and 600 cubic yards top soil and clay in 10 hours.

For further information, see agent's advt., p. 19.

GRABS.

½ yd. capacity, £250 ; ¾ yd. capacity, £300 ; 1½ yd. capacity, £330 ; 2 yd. capacity, £370.

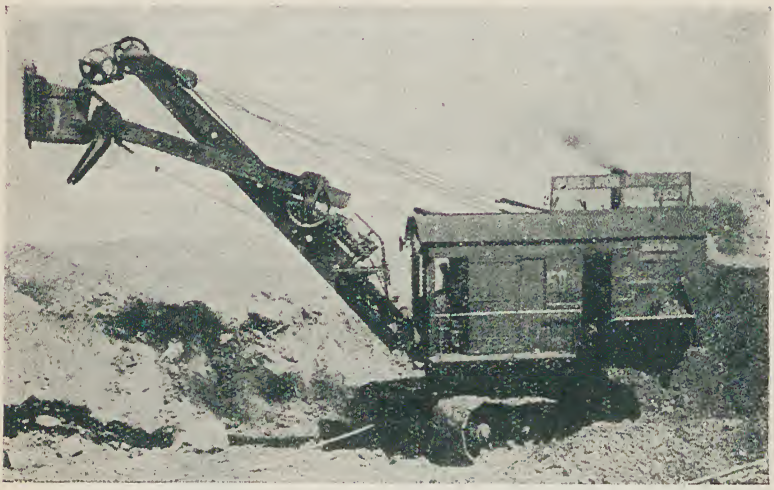
GRAB DREDGES.

Approximate Quantities of material these machines will discharge per day of 10 working hours—average height of lift 20 feet from ground level—worked by *one man only*. Wages, 16/8 per hour, diver.

Size of Crane.	When using the Buckets.		When using the Grabs.	Approx. Price without barge.
	Mud in Dredging.	Small Coal, Sand, &c.	Excavating Clay, &c.	
cwts.	Tons.	Tons.	Tons.	
2½	100			£600
5	175			
10	250	200	150	
20	500	400	300	£1200
30	650	550	400	
40	800	700	500	£1650

The size of the Barge required for carrying the Dredgers depends on the number it has to carry.

For working in canals, narrow rivers, &c., Barges of very small beam can be employed by using loose side timbers, which may be disconnected when necessary.



BUCYRUS STEAM SHOVEL OR "NAVVY."

(*Extracts from "Engineering."*)

In a railway cutting, Grenock, Scotland, marl and rock, 20ft. high by 35ft. wide, assisted by blasting, from 300 to 400 cubic yards was removed per 10 hours, at a cost of 6d. per cubic yard (not including blasting) compared to hand labour of 7/– per cubic yard.

A railway contractor working in heavy clayey soil, states the cost of putting clay on wagons was 3d. per cubic yard, against 3/6 former methods.

It is claimed that these Excavating Machines have shifted at Manchester, Eng., as much as 1100 cubic yards per day of 10 hours, in strong material, the cost of working navvy being 112/– wages ; ¼-ton coal, 10/– ; 670 gals. water, 6/– ; total £6/6/– per day.

Australian present prices for above would be about £12/12/– or 3024 pence for 1000 cubic yards, about 3d. per yard. Add for wear and tear, rail-trucking, 30 per cent.

With the help of a little explosive the navvy shifted the soft English red sandstone very readily, averaging 800 cubic yards per 10 hours.

It is also a useful machine for clay and shale pits excavating and loading.

Prices of Steam "Navvys" range from £2,500 upwards, delivered wharf or rail.

Working Power. Tons.	Total Weight. Tons.	Size of Bucket.	Output per Day—Tons.
12	36¼	1¾ or 2¼	1400
10	28½	1 c. yd.	900
8	26½	¾	700

Sand shifting into trucks, electrical grab crane, one half yard bucket, 200 tons per day.

See Plant for other Excavators.

Extract Sydney "Sun" Report, May, 1926, from Govt. Foreman of Works.

Steam Shovel on caterpillar wheels, shale cutting bank at Redfern, Railway with 3 men in charge and 15 men and 6 horses, loads 15 trucks. per hour of 7 cub. yds. each, loose material = 7 hours day = 735 c. yds.

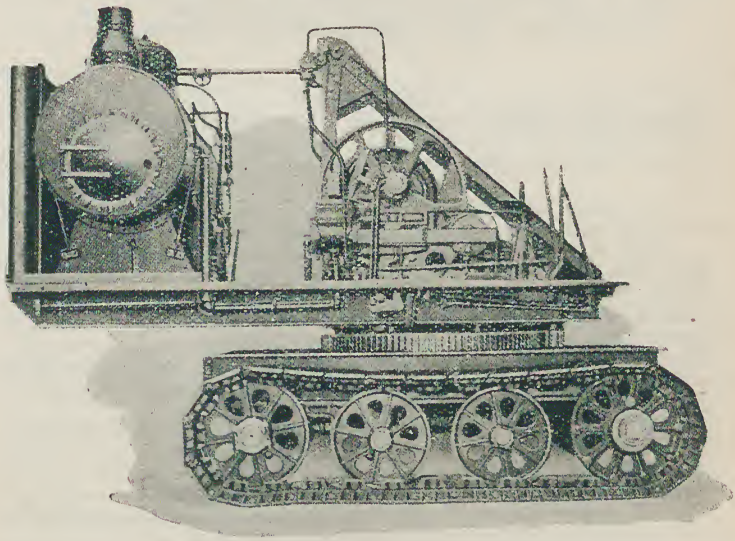
Length of excavation, 500ft. x 90ft. wide x 18ft. high. Advance of 55ft. per month or 2ft. every day.

From the above it would appear as under :—

Wages 3 men in charge at 3/– per hour = 24/– ...	£3	12	0
15 men 7 hours = 105 hours, at 2/6	13	2	6
6 horses, hired 10/– each	3	0	0
Upkeep of Steam Navvy, 5 cwt. coal and oil, &c. ...	1	0	6
1 day sharps drills and blacksmith	2	0	0
Net local cost	£22	15	0

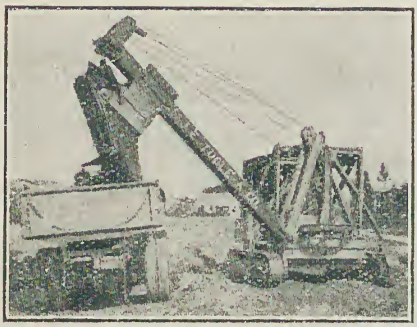
About 7¼d. per c. yd. nett. Add for explosives, supervision, removal and transport of debris.

The portable and working gears are so under command of the one man that it is interesting enough to be illustrated, showing the counter weight balance, including the steam boiler to take part of the strain in the working "digger."



Bucyrus Caterpillar Steam Shovel Machine without Jib or Shovel.

See advt., p. 7.



OIL DRIVEN CATERPILLAR EXCAVATOR.

This machine can also be used as a crane, can be fitted with a **Skimmer, Ditcher, dragline Excavator, Shovel** or **Grab Bucket.**

Price ½ c. yd. filler oil driven Caterpillar Tractor, one man operator, £2,300, delivered Sydney.

See advt., p. 19.

EXCAVATING MACHINERY.

Steam, Electric, or Petrol-Electric Shovels and Drag-line Excavators. Capacity of dippers from ¾ to 8 cub. yards.

From £3,000 upwards, delivered Sydney.

Manufacturers: Marion Steam Shovel Co., Marion, U.S.A.

See advt., p. 13.

SUBMARINE.

Divers' Award, 1923, 6 hours at 29/6; Attendant, 18/– per hour.

Owing to variable conditions, no fixed prices can be quoted. Boring holes for sandstone to receive foot of piles, vary from 30/– to 80/– each.

In bridge foundations, preparatory work, in clearing silt away is usually done by grab dredges. *See* DREDGING.

Scott & Goodsir's Patent Submarine Rock Excavator and Rock-drill, with and without the aid of divers, has done valuable work in Sydney Harbour sandstone, 20 to 30 feet below water. In appearance, it is not unlike a steam pile-driving structure, built on end of punt, with a long cutting chisel working in frame-work, 60 feet high. The operators on platform 37 feet up, as well as on deck, where boiler and machinery are situated. For particulars apply Wildridge & Sinclair, engineers, 82 Pitt-street.

Spikes may be successfully driven under water 12 to 20 feet deep, by placing straight pipe or tube in position. Drop spike down inside tube and drive home with iron or steel rod inside tube.

Drilling for explosives under water, with hand jumper from surface enclosed in pipe driven into debris to surface of rock for guidance of work and charging can be successfully accomplished.

Snagging Rivers by blasting with dynamite, as practised in the Waikato River, New Zealand. The inspection was made by an hydraulic telescope (a gal. iron tube, with glass fixed at end). The holes were bored with 1½in. steel auger.

QUARRYING.

In quarrying it is always considered advisable to obtain a vertical face to the quarry, the higher the better ; if the stone is detached at the ends with a natural cleavage, parallel with the face of the quarry, you will then be able to obtain an immense quantity of stone with a single hole. A block of freestone was detached from the face of a quarry at Sydney, about 150 feet long by 35 feet wide and 46 feet deep. A 5-inch hole was bored in the line of cleavage, about 75 feet from each end of the quarry, and 35 feet from its face, to the bed of the quarry, 46 feet in depth, into which was inserted 200 lbs. of blasting powder, filling up the lower 26 feet of the hole, the upper 20 feet tamped with dry clay. The mass, weighing about 15,000 tons, was moved forward about 18 inches, ready to be wedged and split up into blocks suitable for building. This hole was fired in three places by electricity, removing 75 tons of freestone for every lb. of powder exploded. By Sir F. Burgoyne's formulae for limestone, this would have required

$$353 = \frac{42{,}875}{32} = 1340\text{lbs.} \quad \left\{ \begin{array}{c} \text{the quantity actually used was nearer} \end{array} \right\} \quad 35\tfrac{1}{2} = \frac{1225}{6} = 204\text{lbs.}$$

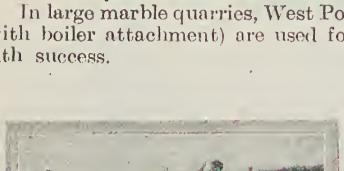
In opening a quarry there is always a loss of labor in removing surface soil from the top, or at the foot of the quarry, down to the natural bed, sometimes both ; also in getting a vertical face and open ends for a really effective or great blast, so than an ordinary quarry does not pay for the first two or three months.

MEASUREMENT.

Although the stones are always quarried larger than the net size required, the latter only is paid for. If the stones are bevelled or angular, the largest dimensions square with each other are reckoned. Soldier stones are building stones laid on the edge in contradistinction to stones laid on their natural bed as generally specified and carried out, but there are many exceptions to this rule because it has been found by actual experiment that some stones where it is usual to set all building stones on their edge except cornices) are actually stronger on their edge than on their natural bed. The Sydney sandstone possesses similar properties, as proved by Professor Warren. The bank at the corner of George and Hunter-streets, the pilasters, 18¼ feet in height by about 2 feet square ; also the stones forming the pilasters opposite the granite columns of the Sydney Post Office, about 12 feet high, are Soldier stones.

QUARRYING BY CHANNELLING MACHINES.

In large marble quarries, West Portland steam channelling machines (with boiler attachment) are used for outlining dimension stone work with success.



Also in the Oolitic limestone quarry, at Bloomington, Ind., and the Columbian marble quarry, the rigid head and swivel head channellers for vertical and inclined cutting, excavate gutters 6½ inches wide to a depth of 14 and 15 feet, less width for less depth.

The wheel pits at Niagara Falls, 185ft. x 21 wide, 480ft. long, and great Canal of Lake Superior Power Co., outlining sides with smooth faces. Compressed air was the motive power to operate the channellers, the centre material was removed by explosives.

Steam Channeller, 1926, cutting sandstone gutter in State Quarry, Maroubra. Speed, 100ft. long x 6ft. x 3in. wide. Clear run, fixing rails and machine, &c., in position to be added.

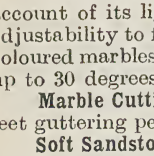
The Swivel-Head machine is more favoured in marble quarries, on account of its light weight, great cutting capacity and wide range of adjustability to follow the grain, and get best results in design from the coloured marbles, cutting straight faces to 10 feet if desired, and working up to 30 degrees inclines on cogged rails.

Marble Cutting, 15 to 20 feet x 3in. wide, per minute = 3 to 5 super feet guttering per minute.

Soft Sandstone and Limestone Cutting, 20 to 30 feet x 3in. wide = 5 to 7ft. 6in., super feet per minute.

Where extensive blocks of Sandstone occur without beds, an under cutter or steam pick is used to cut horizontally.

A channeller to cut 120 lineal feet x 6ft. deep x 3in. wide in typical Sydney Sandstone in an 8 hours' shift, will cost from £850 upwards.



Track Channellers, swivel-head, are now in operation by W. and S. Board, Sydney.

Foundations in Sydney Sandstone are cut out on boundary line of block by the aid of compressed air rock drills, travelling on runner (*see* illustration), with special chisel and feed screws, at half the cost of hand guttering. Foundations throughout city outlined. Agent, Guthridge & Co. Price, from £130 in cities. *See advt.*, p. 7.

ROCK DRILLS.

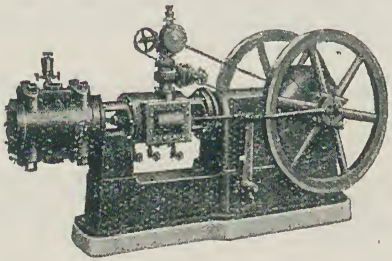
These drills are directed by hand, and work with very little vibration. The holes are kept free of dust and mud by a blast of air, led from the exhaust ports to the face of the bit through the hollow drill steel.

COMPRESSED AIR HAMMER DRILLS—ROTATORS. D.P. 331. Price £40.

All steel material. Weight 38 lb., one-man, self-rotating hammer drills, with steel retainer and automatic lubrication and requiring $\frac{7}{8}$ in. solid or hollow drill steel. They are used for drilling work in highway or street construction, such as cutting trenches, deep drilling in quarries, block holing or horizontal toe hole work on high benches and railway approaches, also North Shore Bridge site, excavations, holes 1½-20 ft. deep, drilled in 2 hours and blasted with compressed blasting powder. Speed can drill in Sydney Sandstone per hour, holes 9 ft. per hour 1in. dia. 6ft. per hour, 1¼in. dia., under favourable circumstances,

AIR COMPRESSORS. See Compressed Air Section.

See Prices Compressed Air Section.



A compressor and three hammer drills drilled on an average of 160 ft. per day. The cost of operation was estimated as follows :—

	£	s.	d.
3 drill operators at 22/- per day	3	6	0
Compressor attendant engineer	0	12	0
Gasoline per day, 15 gallons at 2/-	1	10	0
Add interest, renewals, wear and tear, 10 p.c.	0	12	0
Total cost per day for 160ft. drilled	£6	0	0

Or about 9d. per lin. foot.

From 20 to 80lbs. pressure of air required to work each drill. Cost in coal per drill—4 cwt.

See advt. pp. 7, 13, 19.

Petrol driven compressor fuel, 15 gallons of petrol per day.

Breakers at Work on Street Concrete.

Pneumatic Spaders, for digging clay, &c., in culverts or other underground excavation work. A short light compressed-air tool, with spade handle and blade for confined elbow room spaces.

PNEUMATIC PERCUSSION PICKS. From light pick hammer, 16lbs., to heavy concrete breaker weighing 65lbs. Price, from £35.

Digging Spades, to fix in shaft, £30 each.

See advt., pp. 7, 13, 19.

DIRECTIONS FOR USING DRILLERS OR PERCUSSION DRILL TOOLS.

When the first steel has cut to its depth remove it—never allow your clearance to become too worn ; the following steel, when inserted, should fit the bottom of the hole so as not to jamb.

When a cavity or cross fissure is met with, crank the machine down to a short stroke until the bit or steel has started in the next ledge.

In drilling back holes through damp ground do not run the feed screw the full length. In working the drill back give a good supply of air to prevent the cuttings from packing around the shaft of bit ; then knock back quickly till cleared.

In soft ground, where the debris soon clogs the bit, feed slowly and lightly, and quickly tap with drill, using half head of air and a very long stroke to work debris and water into batter.

Experience has shown that the best quality of hose is most suitable, lasting, and least expensive. For steam hose, marline wound, being cooler to handle than metal winding. Half round wire is recommended for air hose, as the flat surface will not cut the rubber, and prevents kinking.

Flexible metallic tubing is specially made for heavy wear.

See prices of above. *See* India-rubber.

EXPLOSIVES.

BLASTING AND EXPLOSIVES.

Prices liable to fluctuation.

For sandstone quarrying, where the mass of rock is not to be shattered, the slower explosive action of blasting powder is preferable.

In large blasts, chambering for the concentrated charge of the powder is made by simply exploding a cartridge or two of gelignite at bottom of drill hole, and clearing out debris previous to charging. *See* under " Quarrying " for blasting powder required.

BLASTING POWDER, loose, 11½d. per lb. 5lb. bags, 44/– per 50lbs.

COMPRESSED BLASTING POWDER.—This is now much used in sewer work, and is compressed by powerful hydraulic presses into Pellets, 1in., 1⅛in., 1¼in., and 1⅜in. diam., by about 2½in. long, with a hole through the centre for the fuse. Price, 1/– per lb. The advantage said to be :—

A greater amount of powder in a smaller space, and consequently a smaller bore hole is required and quicker charging of holes.

HIGH EXPLOSIVES.

Gelatine Explosives, by reason of their plasticity and greater power and water-resisting qualities, are more suitable and economical than Dynamite, and can be recommended for all ordinary rock-blasting purposes, pit-sinking, tunnelling, quarrying, metalliferous mining, limestone blasting, submarine blasting, etc., and are unaffected by water.

No. 1 DYNAMITE is a reddish-brown moist powder, 40 p.c. Nitro-Glycerine, absorbed in 25 p.c. of Kieselguhr. As Dynamite parts with its Nitro-Glycerine if left for a time in contact with water, it should be kept perfectly dry until used. 58 cartridges to 5lb. packet. **Price,** 57/– per 50lb. case.

BLASTING GELATINE is yellowish in colour, semi-transparent, and elastic to the touch. It is composed of 93 p.c. of Nitro-Glycerine and 7 p.c. of Soluble Gun-Cotton, and is 50 p.c. stronger than No. 1 Dynamite. It is specially suited for submarine blasting, tunnelling and sinking, and where hard rock is to be removed. 52 cartridges to 5lb. packet. **Price,** 1/6 per lb., or 74/6 per 50lb. case.

GELATINE DYNAMITE is an opaque plastic compound consisting of 90 p.c. Nitro Glycerine and Nitro-Cotton, and 20 p.c. Nitrate of Potash and Wood Meal. It is 30 p.c. stronger and has a less shattering effect than No. 1 Dynamite, being specially suitable where the rock is required to be removed in as large masses as possible. **Price,** 66/– per 50lb. case.

GELIGNITE, STANDARD, is an Oralate of Ammonia Compound, or a variety of Gelatine Dynamite, being 12 p.c. stronger than No. 1 Dynamite. It is suitable for all kinds of mining and engineering operations where a milder explosive than B.G. or G.D. can be used. **Price,** 1/2 per lb. or 58/6 per 50lb. case.

Prices Nett for 50-lb. cases only. Subject to Alteration.

NOBEL-GLASGOW.

Gelignite Standard and Ardeer Gelignite ...	58/6	A.2. Monobel, 54/6, Quarry Monobel	56/6
Gelignite 50 p.c. and Ardeer Gelignite No. 2 ...	54/6	Stonobel, 57/6, Lidgynite No. 1	47/6
Gelatine Dynamite, 66/–, Blasting Gelatine ...	74/6	Lig. Dyn. 40 p.c. 51/6, Lig. Dyn. 25 p.c. ...	46/6
Samsonite, 54/6, No. 3 Samsonite 56/–, 40 p.c. Dynamite	57/–		

BLASTING POWDER.

Curtis's & Harvey L.G.B. (bulk), 10½d. per lb. (5lb. bags), 11½d. per lb. John Hall's Compressed Cartridges, 1/– per lb. (c/s 50 lbs.).

DETONATORS, Cases 5,000 and 10,000).

No. 6, 55/– per 100 ; No. 7, 80/– per 100 ; No. 8, 105/– per 100.

THISTLE No. 6 ELECTRIC DETONATOR FUSES.

	4ft. 4in.	6ft.	8ft.	10ft.	12ft.	20ft.	40ft.
Wires							
Per 1000 ...	11/8/–	12/1/–	13/5/–	14/9/–	15/13/–	20/14/–	32/14/–
Per 100 ...	23/6	25/–	27/6	30/–	32/6	42/6	66/6

SAFETY FUSE, per Coil.
Case 300 Coils.

"Thistle" Blue Sump, 8½d. ; Bickford's Double Tape No. 9, 11½d. ; Nobel's Double Tape, No. 12, 11½d.

Smaller lots, 1d. extra.

Cartage, 2/6 per case.

Retail Small Lots, see advt., p. 24.

BLASTING.

Blasting.—One lb. of the best blasting powder will remove from three to six perches of sandstone, or from three to six tons of bluestone, granite, &c., if used in the usual way; the powder is most effective if the line of resistance (the distance from the hole to the face of the rock) does not exceed one-half the depth of the hole, the ends being open or free.

The old method left many latent wasteful cracks in stone that opened out with exposure. The channelling machine followed with plugs and feathers for cross cutting into blocks that fit a 1½in. drill hole, makes modern quarrying methods so sure and saving.

Various kinds of Exploders are made, small and portable, and about 20lbs. each.

Exploder, capacity 10 holes, £6 ; capacity 20 holes, £8.

All directions for charging, arrangement and testing of wires, and firing with above, are printed and accompany machines, and should be followed minutely to detail, to save accident and ensure success.

COST OF DRILLING BY HAND JUMPER.

Labor, 2/3 per hour.

Blasting Powder required for different sizes holes, &c. :—

Diam. of Hole. Inches.	Powder in 1 foot. Lbs.	Depth for 1lb. Powder Feet decimals.	Cost of Drilling, &c., per foot by Hand Jumper		
			Shale	Sandstone.	Bluestone
			s. d.	s. d.	s. d.
1½	0.71	1.41	1 0	1 4	2 8
2	1.26	0.80	1 2	1 8	3 4
2½	1.98	0.51	1 4	2 0	4 0
3	2.83	0.35	1 8	2 6	5 0
3½	3.85	0.26	2 0	3 0	6 0
4	5.03	0.20	2 4	3 6	7 0
4½	6.36	0.16	2 8	4 0	8 0
5	7.86	0.13	4 0	6 0	12 0
6	11.31	0.09	6 0	9 0	18 0

The last column includes labor, sharpening jumper, and fuse in charging and tamping per foot for the first 6ft. ; for the next 10ft. add one-half per foot, and from 16 to 26ft. double. For the first 6ft. one man can manage the drill ; from 6 to 16ft., two men, and from 16 to 26ft., three men are required. If only one size of drill is used—say 4in. in diameter, it will wear away to 3½in. before it is down 20ft., even in the soft freestone of the coal measures, as at Sydney and suburbs.

The hardness of sandstone varies even in the same quarry, but the above table is for the average yellow block Pyrmont stone. In surface sewer excavation I have known a 5ft. hole x 1½in. dia. at surface drilled with hand jumper in 30 minutes, with only three sharps. At 30ft. under surface the same sizes hole took two hours, with 10 sharps. A careful personal inspection and trial holes on site are necessary for safe tendering.

Machine drilling, *see* EXCAVATOR.

ELECTRIC SHOT FIRING.

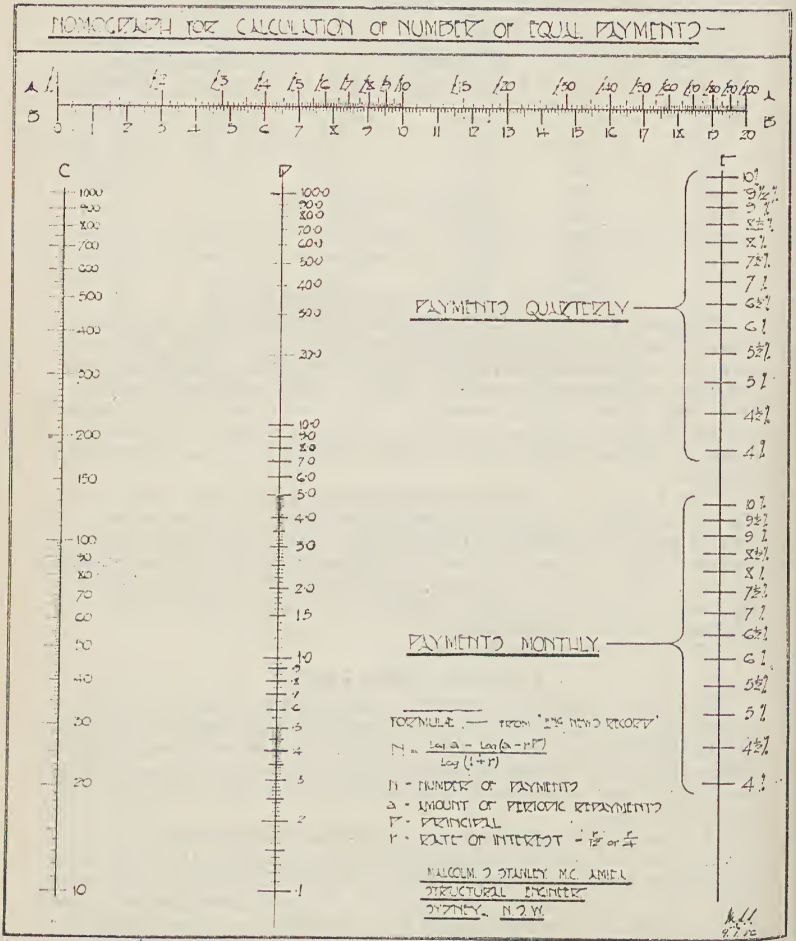
Firing by electricity.—In firing holes simultaneously, a complete circuit must be made with the insulated wire, and wherever the wires are joined, the surfaces must be scraped clean with a pocket-knife. **Safety First**—The battery must be connected by the man that charges the holes, if any holes misfire, the battery must be disconnected before approaching site.

I have fired two 4-inch holes, containing 66 and 34lbs. of blasting powder respectively, 80 yards from charge, removing about 900 tons of Sydney freestone with Exploding Battery C.E.M. I have also fired with success five holes along the cleavage simultaneously, the twin cable of holes being 30 yards only, and the three wires joining the five charges, about 11 yards each, removing 4000 tons sandstone at Pyrmont, Sydney.

8 feet from the face, tight ends, but on good " pug " bed 4 inches thick.

The largest hole in centre of line, removing block 9 inches forward at centre straight out in the form of a **V.**

BUILDING LOANS ON TIME PAYMENT.
The Purchase at Various Interests.



The graph illustrates a very simple solution for determining the number of equal payments which will wipe out the principal and interest on a loan.

The interest may vary from 4 per cent. to 10 per cent. and the repayments may be made monthly or quarterly.

The graph consists of—

(1) A horizontal scale combined, **A** and **B**.
(2) Three vertical scales, **C, 10 to 1,000.**
D, numbers point or decimal .1 to 100,
and E = interests.

Example.—A loan of £1000 at 6 per cent. is to be repaid in equal repayments of £10 *per month.*

The problem is: *How many monthly payments* of £10 will it require to wipe off the principal of £1000 plus 6 per cent. interest on same.

Amount of monthly payment, sec. £10 on top portion scale A corresponds with figure 10 on lower scale B.

Amount of 6 per cent. interest on £1000 is £60 per year, or £5 per month.

One month = £5

Actual reduction of principal = £5 on scale A, corresponds with figure 7 on scale B.

The difference 7 from 10 = 3 (mark on scale D.)

How to Work the Table for Solution.

Join No. 3.0 on scale D with 6 per cent. on monthly section, scale E and connect by straight line with scale C.

The intersection on line C gives the number of repayments required to liquidate the debt, viz., 140 monthly payments.

140 monthly payments at £10 = £1400.

This is the total amount of money repaid to liquidate the loan.

140 monthly payments equal 11 years and 8 months.

Further Example.—A house is purchased with a balance owing of £750 at 7 per cent., repayable quarterly in equal sums of £20. What is the number of payments necessary to repay the loan.

Amount of quarterly payment = £20 on scale A = 13 on scale B.

Amount of quarterly interest = £13 2s. 6d.

Actual reduction of principal = £6 15s. = 8.3 on scale B.

Difference = 13 — 8·3 = 4.7

Work: 4.7 on scale D. Connect this point to 7 per cent, (quarterly) on scale E and join by straight line with scale C, the reading on scale C will then give the number of quarterly payments required to repay the loan with interest, equals 62 payments at £20 = £1240.

62 quarterly payments = 13 years.

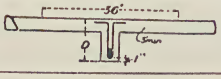
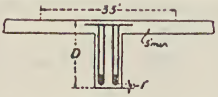
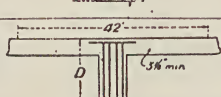
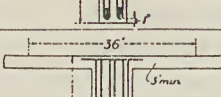
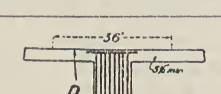
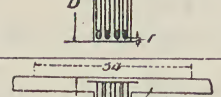
A study of the above graph will amply repay any who care to investigate, it will give rapidly an answer to problems of the above nature, and the final cost for any property, house, etc., purchased on terms will give many a surprise.

If required, larger copies of the graph may be secured through the author of this work.—C. E. Mayes.

TABLE 9

T BEAMS—continuous or with ends fixed.

Reinforced with Round Steel Bars and B.R.C. Stirrups.

Reference No.	Type of Beam b = width of Top ds = thickness of Slab br = width of Rib	Total Depth D (ins.)	Width of Rib br (ins.)	Minim'm Thickness of Slab–ds (ins.)	Minim'm value b × ds (sq. ins.)	Round Bars	
						No.	Diam.
TC11 TC12		9 9	4	3	45	1 1	¾" ⅞"
TC13 TC14		9 11	4	3	108	2	1"
TC21 TC22 TC23 TC24 TC25		10 12 14 16 18	7	3	99	4	¾"
TC26 TC27 TC28 TC29		14 16 18 20	7	3½	147	4	1"
TC31 TC32 TC33 TC34 TC35		16 18 20 22 24	10	3	108	6	¾"
TC36 TC37 TC38 TC39 TC310 TC311		18 20 22 24 26 28	10	4	192	6	1"
TC41 TC42 TC43 TC44 TC45 TC46		22 24 26 28 30 32	13	3½	126	8	¾"
TC47 TC48 TC49 TC410 TC411		24 26 28 30 32	13	4½	243	8	1"
TC51 TC52 TC53		28 30 32	16	4	156	10	¾"
TC54 TC55 TC56		28 30 32	16	5	300	10	1"

The "Type" drawing shows the width (b) required when the slab is the minimum thickness allowed. If the thickness of the slab is increased the width (b) required is correspondingly less, as the product (b × ds) may be the same; (b) may be taken as the distance between ribs.

TABLE 9—SAFE LOADS—UNIFORMLY DISTRIBUTED—TONS

The following Table must only be used where the Bars are fitted with B.R.C. Stirrups to resist shearing stresses, and the top portion of the Beam is reinforced over the supports as described on page 50

Reference No.	SPAN IN FEET										
	10	12	14	16	18	20	22	24	26	28	30
TC11	2·0	1·7	1·4								
TC12	2·8	2·3	2·0								
TC13	5·0	5·0	4·9								
TC14	6·4	6·4	6·3	5·5	4·9						
TC21	8·8	7·4	6·3	5·5							
TC22	11·2	9·4	8·0	7·0	6·2	5·6					
TC23	13·6	11·4	9·7	8·5	7·5	6·8	6·1				
TC24	16·0	13·4	11·5	10·0	8·9	8·0	7·3	6·7	6·2		
TC25	18·5	15·4	13·2	11·6	10·3	9·2	8·4	7·7	7·1	6·6	
TC26	15·0	15·0	15·0	14·9	13·2	11·9	10·8				
TC27	17·5	17·5	17·5	17·5	15·6	14·1	12·8	11·7	10·8		
TC28	20·0	20·0	20·0	20·0	18·0	16·3	14·8	13·5	12·5	11·6	10·8
TC29	22·5	22·5	22·5	22·5	20·5	18·5	16·8	15·3	14·2	13·2	12·3
TC31	24·1	20·1	17·2	15·1	13·4	12·0	10·9	10·0	9·2		
TC32	27·8	23·2	19·8	17·4	15·4	13·9	12·6	11·5	10·7	9·9	9·2
TC33	31·5	26·3	22·5	19·7	17·5	15·7	14·3	13·1	12·1	11·2	10·5
TC34	35·2	29·4	25·2	22·0	19·6	17·6	16·0	14·7	13·5	12·6	11·7
TC35	39·0	32·5	27·0	24·4	21·6	19·5	17·7	16·2	15·0	13·9	13·0
TC36	28·5	28·5	28·5	28·5	26·8	24·1	21·9	20·1	18·6	17·2	16·1
TC37	32·1	32·1	32·1	32·1	30·5	27·4	24·9	22·9	21·1	19·6	18·3
TC38	35·7	35·7	35·7	35·7	34·2	30·7	27·9	25·6	23·6	22·0	20·5
TC39	39·3	39·3	39·3	39·3	37·9	34·0	30·9	28·4	26·2	24·3	22·7
TC310	42·8	42·8	42·8	42·8	41·6	37·4	34·0	31·2	28·8	26·7	24·9
TC311	46·4	46·4	46·4	46·4	45·3	40·7	37·0	34·0	31·4	29·1	27·2
TC41	46·4	38·8	33·2	29·1	25·8	23·2	21·1	19·4	17·9	16·6	15·5
TC42	51·1	42·9	36·8	32·2	28·6	25·8	23·4	21·4	19·8	18·4	17·1
TC43	55·7	47·1	40·4	35·3	31·4	28·3	25·7	23·5	21·7	20·2	18·8
TC44	60·3	51·2	43·9	38·4	34·2	30·8	28·0	25·6	23·6	22·0	20·5
TC45	65·0	55·4	47·5	41·6	37·0	33·3	30·2	27·7	25·6	23·8	22·2
TC46	69·7	59·6	51·1	44·7	39·7	35·8	32·5	29·8	27·5	25·6	23·8
TC47	51·1	51·1	51·1	51·1	50·0	45·0	40·9	37·6	34·6	32·1	30·0
TC48	55·7	55·7	55·7	55·7	54·9	49·5	44·9	41·2	38·0	35·3	33·0
TC49	60·3	60·3	60·3	60·3	59·9	53·9	49·0	44·9	41·4	38·5	35·9
TC410	65·0	65·0	65·0	65·0	64·8	58·3	53·0	48·6	44·8	41·7	38·8
TC411	69·7	69·7	69·7	69·7	69·7	62·8	57·1	52·3	48·3	44·9	41·8
TC51	74·3	63·6	54·5	47·7	42·4	38·2	34·7	31·8	29·4	27·3	25·4
TC52	80·0	68·8	59·0	51·6	45·9	41·3	37·5	34·4	31·8	29·5	27·5
TC53	85·7	74·1	63·5	55·6	49·4	44·5	40·4	37·0	34·2	31·7	29·6
TC54	74·3	74·3	74·3	74·3	74·0	66·6	60·6	55·5	51·3	47·6	44·4
TC55	80·0	80·0	80·0	80·0	79·9	71·9	65·4	59·5	55·4	51·4	47·9
TC56	85·7	85·7	85·7	85·7	85·7	77·2	70·2	64·4	59·5	55·2	51·5

The tabulated loads to the left of the heavy black line do not develop the full bending strength of the beam, but greater loads would exceed the shear strength and are not permissible.

ELECTRICAL.

The prices under this heading are based on the present Customs tariff, so any alteration in rate must be allowed for.

A brief explanation of some of the **Electrical terms** commonly used will be found useful to readers.

ELECTRICAL TERMS.

Current denotes **flow** of electricity along a conductor.

Volt is the unit of **Electro motive force,** E.M.F., the force or pushing power, or difference of potential.

An electro motive force which would cause a current of one ampere to flow through a resistance of one ohm.

Ampere.—The quantity of current flowing through, or the rate at which electricity passes a given point in the conductor.

Watt, or **Volt-Ampere,** signifies the value of output being amperes x by volts. Unit for measuring power.

K.W. or **Kilowatt** = 1000 watts, 1000 watts = 1 unit. Unit is the gauge by which electricity is charged. 1 watt = 1 volt x 1 ampere Board of Trade unit = 100 watts per hour.

Ohm.—The practical unit of resistance in the conductor tending to impede the flow of current.

Megohm = 1,000,000 ohms.

Resistance.—That property of an electric conductor by which it opposes the passage of an electric current.

Insulator.—All substances which resist the passage of electric current are termed insulators, such as glass, slate, marble, vulcanite, mica, and indiarubber.

Positive is signified by the sign plus and **Negative** by minus.

One Horse-power = 33,000 foot pounds per minute = 746 watts.

Brake Horse-power = the available H.P. at the pulley.

Electric H.P. (a rate of electrical performance) = 746 watts.

R.P.M. revolutions per minute.

Prefix " **Milli** " = 1000part.

" **Micro** " = the millionth part.

" **Kilo** " = one thousand times.

" **Meg** " = one million times.

A.C.—Alternating current—an abb. expressing a current having a periodical change in direction.

D.C., Direct Current (also called Continuous Current), a current flowing in the same direction only.

C.P.—Candle-power. 16 C.P. consumes with carbon filaments 56 watts (3.5 watts per C.P.). Metal filaments, 18.4 watts, 1.15 watts per C.P.

" **Candle Foot** " = a unit of illumination equal at a distance of one foot to that which is given out by a standard British candle.

Circuit Breaker.—A device serving to open or break a circuit.

Closed Circuit.—A circuit completed.

D.P. Switch.—An abb. for double-pole switch.

S.P. Switch.—For single pole.

Fuse.—An incombustible box containing a safety fuse.

Holophane.—A glass with a tentaform external surface employed for the better diffusion of the light emerging from an enclosed source.

Short Circuit.—A connection between two parts of a circuit which connection is of low resistance compared to the intercepted portion of a shunt or by-path.

Tension-High.—A term not properly used, signifying electro-motive intensity, also electro-motive force, which should be designated by their proper terms.

Transformer.—An induction coil by which a primary current of high initial electro-motive force is made to produce a secondary current of low initial electro-motive force.

A useful example showing how to calculate cost of electricity consumed :—

All electric apparatus has a fixed rating, shown in watts, viz. : a 50 candle-power lamp consumes 60 watts **per hour** (electrical ratings are usually shown or reckoned at per hour consumption).

$\therefore$ 60 watts per hour, current at 4½d. per 1000 watts or 1 unit $= \frac{4\frac{1}{2} \times 60}{1000} = .27$d.

ELECTRIC MOTORS (Direct Current).

140, 240, 480 Volts, D.C.

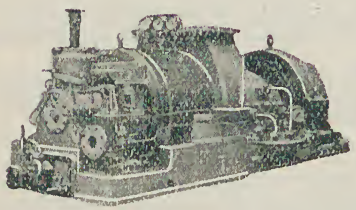
Horse Power	Speed	Motor Pulley and Slide Rails £ s. d.	Starter £ s. d.
2	1350	30 0 0	2 10 0
4	1500	36 0 0	3 10 0
5	1250	40 0 0	3 10 0
7½	1100	56 0 0	4 10 0
10	1400	56 0 0	5 0 0
15	1300	70 0 0	7 10 0
20	1200	88 0 0	9 10 0

(Alternating Current.)

Three Phase 412 Volts, 50 Cycles, A.C. Motors, Rails and Pulleys.

H.P.	Synchrous Speed	Squirrel Cage. £ s. d.	Slip Ring £ s. d.	Starters for Squirrel Cage. £ s. d.	Slip Ring. £ s. d.
2	1500	20 0 0	—	—	—
3	ditto.	24 0 0	—	4 10 0	—
5	ditto.	30 0 0	44 0 0	4 10 0	8 0 0
7½	ditto.	36 0 0	54 0 0	4 10 0	9 0 0
10	ditto.	40 0 0	60 0 0	6 10 0	10 0 0
15	ditto.	50 0 0	65 0 0	8 0 0	14 0 0
20	ditto.	62 0 0	80 0 0	17 0 0	15 0 0

THE BROTHERHOOD STEAM TURBINE.



500 b.h.p. Power, with power-producing reducing valves.

The motor in casing 3 ft. long, developing 4,500 h.p. at 3,000 revolutions per min.

Extract from Manufacturer's Printed Book.

Comparative Cost of Working. Steam for work plant needing 15,000 lbs. of steam an hour, added quantity, at 30 lbs. per square inch, from Lancashire type of boiler which requires about 2,000 lbs. of coal an hour costing, say, 35/–, and using power added up = 300 b.h.p. of electrical driven 200 k.w. Power is hardly likely to be bought or generated on a moderate scale for less than ¾d. a unit, say ½d. for b.h.p. hour. The cost of power will therefore be about 12/6 per hour.

Now if steam be generated in a high pressure boiler with a moderate degree of superheat and used in a Turbine which delivers the steam at 30 lbs. per square inch, the turbine will develop, if required, about 350 h.p., say 230 k.w.

By increasing by about 5 per cent. the coal hitherto used to produce low pressure steam only, the whole cost of power will be saved, and in the case cited above, the saving over a year of only 3,000 hours will be £1,500, or thereabouts; in other words: "The power costs practically nothing."

A Turbine runs without perceptible noise and entirely without vibration.

Momentary variations in speed are impossible, owing to the immense amount of energy stored up in the rotating discs, for instance, a 500 h.p. Brotherhood Turbine possesses over 10 times the flywheel effect which can be obtained with an ordinary 7 ft. flywheel running at 250 revs. per minute.

For price and particulars, see advt., p. 13.

PELTON WATER WHEELS.

Head of Water, 90ft.

Size of Wheel. in.	H.P.	Cubic Feet.	Price Unmounted £	Weight cwt.
30	9	73	110	25
36	14	109	130	38
42	19½	150	180	62
48	25	196	220	80
60	40	314	270	95

ELECTRIC LIGHTING.

Indoor lighting requires according to purpose from 2 to 5 candle power per 10 square feet.

Outdoor lighting, ditto, ½ to 2 candle power per 10 square feet.

Indirect and **semi-indirect lighting** is becoming popular owing to the softness and better diffusion of light.

Cost.—The electric installation is usually quoted for at **per point.** Prices, according to system adopted, range from 25/– enclosed wiring in plain conduit to 35/– per point in screwed conduit tubes, including plain cord pendants and lamps (carbon filament) and shade disc. Add for special lamps.

Power points for heating apparatus, fans, &c., from 40/– per point.

1922 Award Wages, Fitters, 2/4½ per hour.

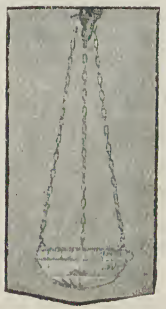
COUNTRY LIGHTING.

Small sets, for 20 lights, from £100.

Electric light bulbs, from 2/- each upwards.

SEMI TRANSPARENT PORCELAIN GLOBES AND BOWLS.

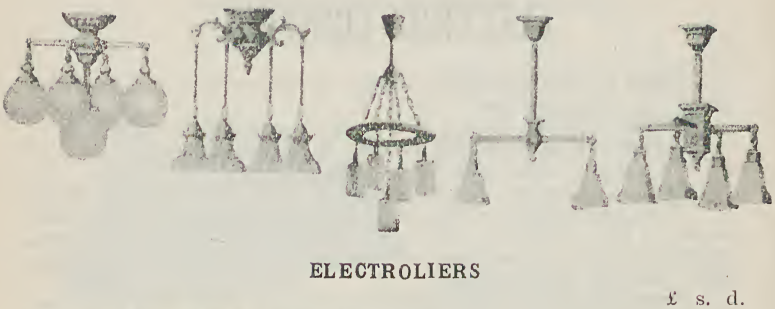
For ceiling reflectors or pendants. Prices range from 25/– upwards.



FITTINGS.

	s.	d.
Plain pendant, with ceiling rose, flexible cord, shade and holder, each 2/6 to	6	0
Counter balance pendant, ceiling rose, flexible cord, porcelain counter weight, with shot, fitted with—		
10in. opal shade and holder, each, from	9	0
3 light plain spider fitting only, each	36	0
3 light fancy do. do., each	40	0
3 light fancy pendants, each, from ... ... 50/- to	150	0

All fittings over 2lbs. weight must have auxiliary support.



ELECTROLIERS

	£	s.	d.
3 light plain brass, 4ft. stem, each, from	2	5	0
5 light do. do. each, from	4	0	0

For copper, bronze, or oxydised silver finish, add 25 per cent.

WALL BRACKETS.

	s.	d.
9in. plain swan neck, ½in. tube, each	3	6
12in. fancy, plain brass, ½in. from	9	0
2 light do. do. each, from	20	0

TABLE STANDARDS AND NEWEL LAMPS.

	£	s.	d.
12in. plain standard, with gallery shade and holder, each, from	0	18	6
Fancy do. do. fancy shade and holder, each, from ...	1	10	0
Newel standard, 3 light, 4ft. p. brass, 1in. stem, each ...	8	0	0

MATERIAL AND PRICES FOR GENERAL HOUSE WIRING.

Switchboard Single Circuit, 7/6 each.

⅝in. Conduit, Plain, 7/6 per 100ft.

¾in. Screwed Conduit, 20/– per 100ft.

⅝in. Elbows (Fittings), 2/3 per doz. ; **⅝in. Tees,** 3/– per doz. ; **⅝in. Couplings,** 1/10 per doz. ; **⅝in. Saddle,** 1/6 per gross ; **¾in. Saddle,** 2/6 per gross.

Clouts, 1/– per packet ; **¾in. Crampets,** 4/– per gross ; **⅝in. Crampets,** 3/9 per gross.

⅝in. Plain Bushes, 7d. per doz. ; **¾in. Screwed Bushes,** 9d. per doz. ; **⅝in. Earth Clips,** 12/– per gross. ; **¾in. Earth Clips,** 15/– per gross ;

¾in. Bell Mouth, 2/9 per dozen ; **1½in. Button Insulators,** 1/1 per dozen ; **3½in. Wood Block,** 14/– per gross.

Ceiling Switches, 3/9 to 7/– each ; **Tumbler Switches,** 1/6 to 2/6 each ; **Porcelain Switches,** 1/8 each.

Shades, Opal, 9d. each ; **Lamp Holders,** 8d. each ; **Ceiling Roses,** 8d. each ; **Lamps,** from 1/2 each.

HEATING APPARATUS.

	£	s.	d.
Glow Radiators, cast iron, black Japan finish—			
2 light, £2 ; 3 light, £3 ; 4 light	4	0	0
Ornamental hammered copper, 2 light, £4 ; 3 light, £4/10/– ;			
4 light	5	0	0
Laundry Irons, 7lb., with flexible cord, 100-240 bolts, each £1/5/– to	2	7	6
Soldering Irons, with 4 detachable copper bits, each ⅜in., ⅝in., ¾in., 1¼in. ... ... £3/7/6 to	3	17	6
Kettles, polished copper finish, from—			
2 pint, £2 ; 3 pint...	1	5	0
Glue pot, for workshop, each	1	5	0
Electric Grillers, prices according to size, each, from ...	4	12	6
Electric ovens, 8-10 persons, with 3-ring top	15	0	0
Hot Plates	0	17	6
Toasters	2	15	0

ELECTRIC FANS.

	£	s.	d.
Desk or Wall			
200-250 volts, 12in., each £6/10/- 16in., each... ...	8	5	0
Oscillating, add 25 per cent.			
Ceiling Fans—			
Four blade, Japan finish, 56in. sweep	5	5	0
Ditto, copper, oxydised, 56in· sweep	6	0	0
Speed regulators for ceiling fan, 6 speed, each... ...	1	5	0
Sewing Machine Motors (Western)	5	15	0
Vacuum Cleaners, with Motor Driven Brush	18	17	6
Exhaust Fans, with **Motor attached**—			
12in. blades, air displacement 1100 c. ft. per min. ...	13	10	0
18in. blades, air displacement 2200 c. ft. per min. ...	19	10	0
24in. blades, air displacement 4000 c. ft. per min. ...	36	0	0
36in. blades, air displacement 12,000 c. ft. per min. ...	50	0	0
Water Motor Fans, 12in. blades, 30lb. sq. inch pressure, each	5	0	0

ELECTRIC BELLS—For House or Factory Use.

	Per point fixed. £	s.	d.
All wires cased in zinc tubing, with indicator	1	5	0
With fixed wall or hanging pear, best quality	1	17	6

BELLS.

	£	s.	d.
Accessories—			
3in. gong, ordinary quality, 3/6 ; best quality, 5/– ; 6in. each	1	0	0
Continuous action, for alarm, 8in. gong, each	4	0	0
Burglar Alarm, window and door contacts, each ...	0	2	6
Ditto, gate and outdoor use, watertight, each ...	0	3	6
Portable bell sets, with flexible cord, for sick rooms, each	1	10	0

TELEPHONES AND TELEPHONETTES.

	£	s.	d.
Internal Office, fixed transmitter and separate receiver, to work up to ¼ mile line, battery ringing, each	2	7	6
House Telephone, fitted with combination receiver and transmitter from each	0	17	0
Ditto do., fixed transmitter, kitchen type	0	11	0

The above may be used in conjunction with existing bell line.

LONG DISTANCE TELEPHONE.

Wall Pattern.

	£	s.	d.
Half to 2 miles, two magnet generator	2	10	0
Ditto, 2 to 100 miles, as used by Government	5	0	0
C Batteries, for telephones, "Leclanche," complete, per cell	0	2	6
Mining telephones, watertight and gas proof case	9	10	0
Inter-communication system for warehouses, fitted complete with switches, per telephone	3	10	0

TUNGAR RECTIFIERS.

For Charging all Radio and Automobile Storage Batteries.

New Model 2 amp. Tungar Rectifier to operate from 240 volt single phase 50 cycle supply for charging. Price £8 10s.

Ditto, 5 amp. Rectifier. Price £12.

Tungar Rectifier, Four Bearing Motor Generator Sets, for charging starting, lighting and ignition Batteries. Will charge up to four 6 volt Batteries at 10 amps. or lower. Price £42.

WHAT IS A TUNGAR?

A Tungar is a rectifier or device for changing alternating to direct current, and is useful for charging, Lighting or Starting car batteries. You can charge your batteries at home from any lamp-holder or wall plug. It is automatic, noiseless, and simple in action, and requires no oiling or other attention. At 5d. per unit, it will put a 40 amp. hour charge in your car battery for 3d.

CHARGE FOR SUPPLY FROM M.C. OF SYDNEY.

ELECTRICITY DEPT.

Residence Rate. Whether the electricity is used for lighting, heating, or any other purpose, 5d. per unit up to 2½ units, per quarter per 100 sq. feet of area enclosed and covered by outer walls of buildings.

1¼d. per unit for all beyond that quantity for single storey buildings.

The number of units charged at 5d. to be increased by 2½d. per quarter per 100 square feet of each floor above or below the ground floor.

In determining the area of the building, **measurements** will be taken round the outside of the walls at floor level, including all verandahs.

Electricity used for continuous water heating will not be supplied at Residence Rate, but at 3/6 per month per 100 watts of demand.

Electricity used for the **Production of Light in Factories** will be supplied at 4¾d. per unit, or alternatively on the Maximum Demand System, 5¼d. per one hour's use daily, of the maximum demand, and 2¼d. for all units above that quantity.

A rental is charged at 10d. per month for the Maximum Demand indicator.

TEMPORARY SERVICE. Where it is necessary to lay a temporary service for building operations, etc., the cost of installing and dismantling the service will be charged to consumer, and a substantial deposit lodged.

Floor Polishing Machine. For operating single phase floor polishing machines, a charge of £1 is made for connection and disconnection, and power at cost of 6d. per unit for less than one month's use.

SUPPLY PRESSURES FROM CITY COUNCIL OF SYDNEY.

Direct Current. D.C.

For **Lighting, heating, cooking apparatus** and **motors,** under 3 h.p., 240 volts.

For **Motors** of 3 h.p. and over, 480 volts.

Alternating Current. A.C.

For **Lighting, heating and cooking apparatus,** and **motors,** not over 1 h.p., 240 volts ; single phase, 50 cycles.

For **Motors** over 1 h.p., 415 volts ; 3 phase, 50 cycles.

Extract from Sydney "Sun," July 19, 1926.

RADIO FACILITIES FOR THE HOME.

The architects are considering the locating of "suitable niches in various parts of the house for the receiving sets to stand on.

The aerials, of course, are hung out of sight between the roof and the ceiling, or round the picture rails. Even this is unnecessary where an outdoor aerial is used. Arrangements are made so that the loud speaker can be carried from room to room, without the necessity of a long length of wire."

The cost of wiring and insulators, &c., can be easily obtained from the preceding pages of this book.—C.E.M.

CABLES FOR HOUSE WIRING.

	Per 100 yards. £	s.	d.
Rubber Cab Tyre Flexible $^{23}/_{36}$, $^{11}/_{.012}$	4	5	0
Twin Braided Flexible $^{23}/_{.006}$	2	5	0
$^{1}/_{.044}$ Lighting Cable, 600 megs.	0	14	0
$^{1}/_{.064}$ Power Cable, 600 megs.	1	0	0
$^{7}/_{.036}$ Main Leads Cable, 600 megs.	2	0	0
$^{7}/_{.036}$ Earth Wire, per lb.	0	1	9

TWIN LEAD COVERED WIRES.

Per 100 yards.

$^{1}/_{.044}$, £2/13/10 ; $^{1}/_{.064}$ power, £3/15/1 ; $^{7}/_{.036}$ Main lead, £6/3/3 ;

GENERAL LIST OF CABLES.

Covered with Vulcanised India Rubber, Taped and Braided, 600 megohms.

Sq. inches	Inches.	Current carried without heating. Amps.	Price per 1000 yards
.0015	$^{1}/_{.044}$	6.1	7 0 0
.003	$^{1}/_{.061}$	12.9	10 5 0
.1003	$^{3}/_{.036}$	12.0	11 10 0
.007	$^{7}/_{.036}$	24.0	20 10 0
.010	$^{7}/_{.044}$	31.0	26 0 0
	Industrial Cables.		
.0225	$^{7}/_{.064}$	46.0	43 10 0
.040	$^{19}/_{.052}$	64.0	75 0 0
.060	$^{19}/_{.064}$	83.0	103 0 0
.075	$^{19}/_{.072}$	97.0	126 0 0
.100	$^{19}/_{.083}$	118.0	159 0 0
.120	$^{37}/_{.064}$	130.0	195 0 0
.150	$^{37}/_{.072}$	152.0	237 0 0
.200	$^{37}/_{.083}$	184.0	301 0 0
.250	$^{37}/_{.093}$	214.0	365 0 0

ADAPTORS.

English Wood, Bayonet Cap, 7/- per doz. ; **Adaptor Holder, Bayonet Cap,** 2/9 each.

WOOD BLOCKS, MISSION FINISH.

3½in. x 1in., Round Beaded Edge, 14/- per gross ; 4in. x 1in., round, 2/6 per doz. ; 5in. x 1in., round, 4/3 per doz. ; 6in. x 1in., round, 6/6 per doz. ; 7in. x 1in., round, 9/- per doz. ; 8in. x 1in., round, 12/- per doz. ; 9in. x 1in., round, 15/- per doz. ; 3½in. square, 2/3 doz. ; 3½in. x 6½in., rectangular, 3/9 doz. ; 3½in. x 9½in., rectangular, 5/- doz..

Ceiling Roses, Porcelain, 2-in. plate, 7/6 doz. ; 3-in. plate 10/- doz.

BLACK STEEL CONDUIT, per 100 ft.

inches diameter.	½	⅝	¾	1	1¼	1½	2
Plain	7/–	7/6	11/6	20/–	33/–	40/–	58/–
Screwed		14/–	20/–	29/–	37/–	52/–	80/–
Oval Conduit ...		9/–					

SCREWED STEEL CONDUIT FITTINGS.

inches diameter	⅝	¾	1	1¼	1½	2
Elbows	2/6	3/–	5/6	10/6	16/9	29/–
Bends	4/3	5/6	10/6	21/–	27/6	62/–
Tees	2/9	4/3	8/9	18/6	21/–	31/–
Insp. Tees	5/–	6/6	13/6	—	21/–	40/–
Insp. Elbows	4/–	5/–	10/–	—	—	—
Bushes...	–/7	–/9	1/–	2/6	3/6	4/–
Flanges	3/–	3/–	—	—	—	—
Couplings	1/9	2/6	3/–	6/–	9/3	12/–
Bell Mouth	2/9	2/9	4/–	7/6	10/–	14/–
Locknuts	1/6	2/–	2/6	—	—	—

GRIP CONDUIT FITTINGS.

inches diameter	⅝	¾	1	1¼	1½	2
Tees	3/–	3/9	14/9	25/–	32/–	67/–
Elbows	2/3	3/1	10/6	19/–	26/–	47/6
Couplings	1/10	2/6	6/9	9/6	14/–	27/6

SUNDRY CONDUIT FITTINGS, per Gross.

Inches diameter	⅝	¾	1	1¼	1½	2
Crampets	3/9	4/–	6/6	9/6	10/6	—
Saddles	1/6	2/–	3/9	6/9	10/–	15/–
Earth Clips	12/–	15/–	18/–	21/–	24/–	27/–
Plain Bushes	–/7	–/9	1/–	2/6	3/6	4/–

JUNCTION BOXES.

	inch	2 way	3 way	4 way
Round Grip	⅝in.	7/9	8/3	8/9
Round Grip	¾in.	9/–	9/3	10/–
Round Screwed ...	⅝in.	8/–	8/6	8/9
Round Screwed ...	¾in.	8/6	8/9	9/6

Centerweight, complete, 2/3 ; Shot for Centerweight, 9d. per lb.

LAMP HOLDERS, per doz.

Cord Grip, Bayonet Cap, 7/6 ; **Batten Holder,** 9/3 ; ⅜in. **Holders,** 8/3 ; ½in. **Holders,** 8/3 ; ¾in. **Holders,** 8/6 ; **Key Holders,** 33/–.

BELL INDICATORS.

2 holes, 15/– ; 3 holes, 16/6 ; 4 holes, 21/– ; 5 holes, 23/– ; 6 holes, 26/6 ; 7 holes, 36/6 ; 8 holes, 37/6 ; 9 holes, 40/– ; 10 holes, 42/6 ; 12 holes, 48/–.

BELLS, BUZZERS AND PUSHES.

2½in. Bell, each 2/9 ; 3in. Bell, each 3/– ; Buzzer, each 3/– ; Pushes, 12/– per doz.

Wall Plugs, 3/– each.

MARBLE SLABS FOR SWITCHBOARDS.

Polished Face, Sawn Edges, ¾in. thick, 6/– per sq. ft.

SHADES, per doz.

8in., Opal, 7/6 ; 9in. Opal, 8/6 ; 10in. Opal, 11/– ; 12in. Opal, 26/– ; 8in. Enamel, 8/– ; 9in. Enamel, 9/– ; 10in. Enamel, 10/6 ; 12in. Enamel, 20/– ; 15 in. Enamel, 30/–.

CEILING SWITCHES.

Combined Switch and Ceiling Rose, 4/3 each.
Ceiling Switch, 1 Amp. s. pole, 4/3 each ; 5 Amp., 2 way, 4/9 each.

Flush Switches, each.

Single Pole, complete with box, brass, 3/3 ; O. Copper, 3/6 ; 2 way, Brass, 3/9 ; O. Copper, 4/–.

Rotary Snap Switches, Nickel, each.

3 Amp. **Non Indicating,** s. pole, 1/6 ; **Indicating,** s. pole, 1/8 ; **Non. Indic.,** 2 way, 3/6 ; 4 way, 5/6.
5 Amp. **Indicating,** D. pole, 3/10 ; 10 amp., 4/6 ; 20 Amp., 9/– ; 30 Amp., 11/– ; 50 Amp., 19/–.
For **Porcelain Covers,** add 3d. to the cost of Nickel Covered Switches.

Tumbler Switches, 5 Amperes, per doz.

S. pole, Brass, 13/– ; Porcelain, 22/– ; 2 way Brass, 21/6 ; Porcelain, 30/–.
Le Clanche Cell Complete, 2/9.
Bell Wire, D.C.C., 4/6 per coil.
Silk Bell, Flexible, 20/– per gross yards.
Insulated Staple, 1/ per 100.

WIRES AND CABLES.

Weights per 1000 yards.

Size		Silk		Cotton		Heating	Resistance
S.W.G.	Bare Copper	S.S.C.	D.S.C.	S.C.C.	D.C.C.	Michrome	Eureka
	lbs.						
8	232.5	234.3	234.6	235.8	237.6	219.0	232.5
10	148.8	150.0	150.6	151.2	152.4	135.0	148.8
12	98.2	99.3	99.6	100.2	102.4	87.0	98.24
14	58.13	58.8	59.1	59.4	60.3	54.0	58.13
16	37.2	37.8	38.1	38.4	39.0	33.9	37.20
18	20.93	21.3	21.45	21.63	21.87	16.8	20.93
19	14.53	14.94	15.09	15.18	15.45	13.26	14.53
20	11.77	12.24	12.36	12.51	12.72	10.74	11.77
21	9.30	9.54	9.66	9.78	9.99	8.49	9.30
22	7.12	7.56	7.62	7.74	7.86	6.72	7.12
23	5.23	5.46	5.55	5.64	5.79	5.31	5.23
24	4.39	4.53	4.62	4.74	4.86	4.23	4.39
25	3.63	3.78	3.87	3.93	4.08	3.36	3.63
26	2.94	3.06	3.09	3.21	3.33	2.67	2.94
27	2.44	2.58	2.61	2.67	2.82	2.10	2.44
28	1.98	2.07	2.10	2.19	2.32	1.68	1.98
30	1.39	1.47	1.50	1.59	1.65	1.32	1.39
32	1.05	1.14	1.17	1.20	1.32	1.05	1.05
34	.768	.84	.87	.93	.99	.657	.768
36	.524	.57	.60	.66	.72	.431	.524
7/036	83.81						
7/044	149.0	Generally used for earthing purposes.					
7/064	2 64.81						

CONDUIT REDUCERS.

Dia.	doz. s. d.	Dia.	doz. s. d.
$\frac{3}{4}$ x $\frac{5}{8}$	6 0	$1\frac{1}{4}$ x 1	13 1
1 x $\frac{5}{8}$	7 6	$1\frac{1}{2}$ x 1	15 9
1 x $\frac{3}{4}$	8 5	$1\frac{1}{2}$ x $1\frac{1}{4}$	18 5
$1\frac{1}{4}$ x $\frac{5}{8}$	10 6	2 x $1\frac{1}{2}$	27 3

ADJUSTABLE DIE STOCKS.

Complete with Dies to cut Threads of Conduit.

101c., $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$in., £2 5s. ea.
102c., $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$in., £3 12s. ea.
103c., $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$in., and 2in., £4 17s. 6d. ea.

BRITISH WINDING WIRES (Copper).

Size S.W.G.	S.C.C. Per lb.	D.C.C. Per lb.	Size S.W.G.	S.S.C. Per lb.	D.S.C. Per lb.
16 ... ... to 40	1/9 16/6	1/7 17/-	20 ... ... to 44	3/2 35/-	4/6 45/-

Enamel Covered.		Enam. and Single Cotton Covd.	
16 to 44...	1/9 13/-	14 to 30...	2/- 5/-

Fuse Wire.

Amps.	Gauge.	Price per lb.
5	41	5/9
10	33	3/6
20	27	3/3
50	22	3/3
100	18	3/3
160	16	3/3

Copper Lugs or Terminals.

Cable	Hole	Stud Hole	Price Doz.
1/.064	$^{6}/_{32}$	$^{5}/_{32}$	1/6
3/.036	$^{6}/_{32}$	$^{5}/_{32}$	1/6
7/.064	$^{8}/_{32}$	$^{9}/_{32}$	1/9
19/.064	$^{13}/_{32}$	$^{10}/_{32}$	4/3
37/.064	$^{19}/_{32}$	$^{12}/_{32}$	9/8
91/103	$^{17}/_{32}$	$^{35}/_{32}$	94/-

Resistance Wire.

Eureka		Nichrome Round		Ribbon	
Size S.W.G.	Price lb.	Size S.W.G.	Price lb.	Size S.W.G.	Price lb.
6 to 38	3/- 12/7	12 to 36	12/6 34/6	$^{1}/_{32}$ x .003 ... $^{1}/_{16}$ .007	54/- 34/-

See Weight Table.

Insulating Materials.—Varnishes: Clear air drying varnish, Black, 10/9 per gal., clear stoving, 10/- per gall.

Bitumen Compound, 40/- per cwt.

Clear Mica.
Cut to size.

	lb.
3in. x 2in to 11in. x 7in.	12/9 20/-

Micanite Tubing.

	lb.
$^{3}/_{16}$in. x $^{5}/_{8}$in.	3/6
$^{3}/_{4}$in. x $^{13}/_{16}$in.	3/-

Presspahn Paper, Sizes from .008 to .040, 1/6 lb.
Leatheroid, sizes from .008 to .145, 2/6 lb.
Varnished Cambric, size .007, 2/2 lb., .010, 2/1 lb.
Varnished Silk, size .003, 9/1 lb., .005, 10/6 lb.
Friction Tape, 8oz. ¾in. rolls, 1/1 ea.
Varnished Cambric Tape (cut on beds), 5/- lb.
Burgess A. Batteries, for bell No. 6, 1.5 volts, for general service, 2/9
Hot Shot Battery, 6 volts, for ignition purposes, 12/6.

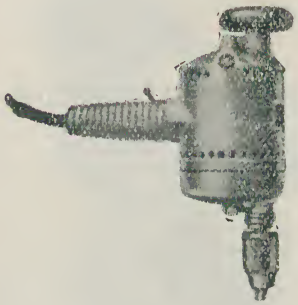
FLOOD LIGHTING REFLECTORS.

16 " Parabolic " Aluminium Reflector, cast iron casing, for 500 watt, £12.

Ditto, sheet steel casing, £18.

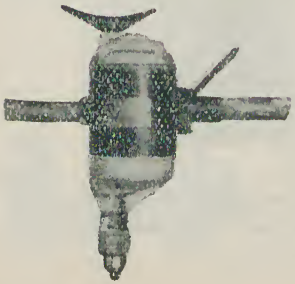
X Ray Projector, with No. 800 X Ray Reflector, swivel and tilting base, 250 watt, £12.

CONTRACTORS' REVOLVING DRILLING HAND TOOLS.
PORTABLE ELECTRIC TOOLS.
Drills—240 Volt Universal Current.



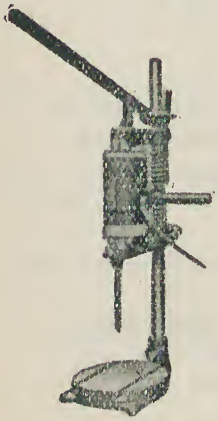
Light duty steel drill, capacity ¼in., weight 5 lbs., speed 2000 r.p.m., with 8ft. flexible cord, plug and chuck, with wrench. Price £7 5s.

CONTRACTORS' REVOLVING BREAST DRILL.



Light Duty Drill, capacity up to ½in., in steel; weight 11¾ lbs.; speed 400 r.p.m., fitted with breast plate, extra side handle, and complete with 8ft. flexible cord, plug and chuck, with wrench. £17 10s.

CONTRACTORS' REVOLVING BENCH DRILL.



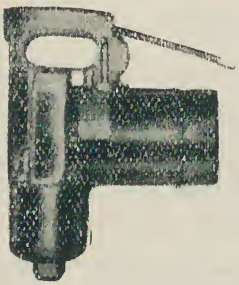
No. 78 U.E. **Heavy Duty Drill,** capacity $\frac{5}{8}$in., in steel; weight 21 lbs., speed 350 r.p.m., fitted with breast plate, extra side handle, and complete with 8ft. flexible cord, plug, and chuck, with wrench. £35.

E.D. **Drill Press Stand,** for No. 78 Type U.E. Drill. £15.

No. 80 U.G. **Heavy Duty Drill,** capacity $\frac{7}{8}$in., in steel; weight 45 lbs., speed 175 r.p.m., with pressure screw, breast plate or D handle. £50.

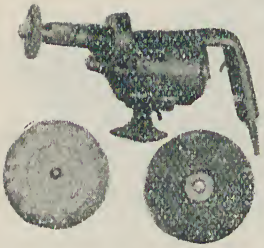
CONTRACTORS' PERCUSSION DRILLING AND CHIPPING TOOL.

HAMMERS—240 VOLT U.C.



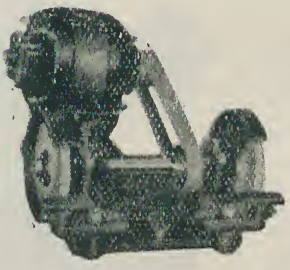
Concrete Hammer, capacity 1in. hole; weight 26 lbs., 1800 blows per minute, complete with 8ft., flexible cord and plug, switch in handle wrench and one drill steel. Price £59 10s.

GRINDERS.



Bench Grinder, with two 4in. x ½in. wheels, complete with G.E. type S.A. ¼ h.p. 240 volt A.C. or D.C. Motor, with 8ft. flexible cord and plug. Price £17 10s.

CONTRACTORS' SELF CONTAINED TOOL GRINDER.



Tool Post Grinder, ⅛ h.p., 240 volts universal current, no load, speed 10,000 r.p.m., equipped with Cutter grinding rest, compound wrench, cross-feed lever, oil can, one 4in. and one 2½in. elastic wheel, 8ft. flexible cord and plug, with switch in cord. Price £15.

Portable Electric Saw, 240 volts U.C., weight 15 lbs., no load, speed 3,600 r.p.m., with 6in. diam. saw blade, maximum cut 1¾in. complete with 8ft. extra tough rubber cord with plug. Price £31.

Electric Heater Control, for starting and stopping at required heat and re-starting automatically, maintaining heat from 200 up to 500 degrees.

Electric Timer starts and stops oven per time on clock dial.

Bath Heater, Dux, with glazed porcelain container, nickled piping and shower, economical, clean porcelain, and less space required. Turn switch and water under control. No fumes.

Tennis Court. Price £9 10s.

Electric Side Lighting, with reflector, weatherproof holder and eye suspension, including 500 watt gas-filled Edison lamp, 17/6. Each light, £3 6s.

Overhead equipment, 1500 watt, G. filled Edison, £2. Each light, £3 9s.

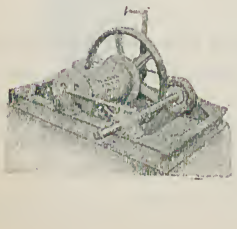
10in. Single Fire Marvel Forge Blower, complete with direct connected 1/15 h.p. Universal variable speed motor for 240 volts D.C. or 240 volts 50 cycles A.C. supply, with 7 points, speed regulator. Price, £16 10s.

TURBINAIR PORTABLE COMPRESSED AIR HOISTS.

Contractors are constantly finding new uses for the light single or double drum. The single drum hoist weighs only 285 lbs., will wind 500 feet of $\frac{5}{16}$in. wire rope, requires $\frac{3}{4}$in. air hose, and 75 lbs. pressure or less.

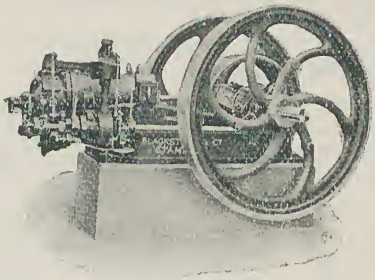
This hoist may be set on a wagon body, bolted to a timber or the base of a derrick. A band brake and clutch are provided. The Turbinair motor gives high starting torque. This hoist will handle 2,000 lbs. on a straight vertical lift, and will pull a 50-ton freight car on level track.

Electric and steam 6½ h.p. portable hoists are also in both single drum and double drum types. Price, from £43.



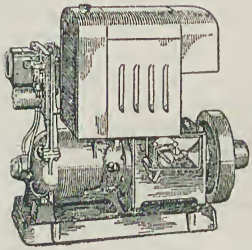
Contractors' Friction Hoist, Stationary, with lever handle for applying power from gas, steam or motor engine. On 4ft. x 3ft. frame. Price, from £35.

See advt., pp. 13, 19.



"Blackstone" Spring Injection, cold Starting, 17 B.H.P. Stationary Engine. Price £265.

Agents' advt., p. 13.



HOUSEHOLD LIGHTING.

20 light 75 c.p. Electrical Self Contained Plant, for installing electric light.

Price £108.

For particulars, see advt., p. 25.

"**Westinghouse**" Light and Power Plants, 1½ h.p., 750 watt for 32 volt (operating at 1250 r.p.m.), with WG7, 100 amp. hour battery. Complete £160.

Ditto, with 134 amp. battery, £175; 200 amp. battery, £190.

With WG17, 267 amp. battery, £210.

Engine and generator unit only, £120.

3 h.p., 1500 watt for 32 volt, with 200 amp. hour battery. Complete, £245. With 267 amp. battery, £285.

Generator unit only, £155.

3 h.p., 1500 watt for 110 volt (operating at 1200 r.p.m.), with 100 amp. battery. Complete, £325; with 145 amp. battery. Complete £355; with 200 amp. battery. Complete, £385.

Engine and generator unit only, £165.

"**Westinghouse**" Light and Power Plant, 3 h.p., 1500 watt, for 110 volt (operating at governed speed). Operates without batteries, £170.

POWER REQUIRED FOR MACHINERY.

See pp. 22, 25.

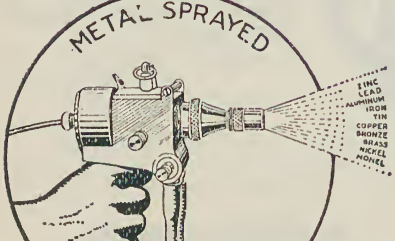
WOODWORKING.

Contractors' Hoist, 6 h.p.; 12in. Circular Saw, 4 h.p.; 15in. Circular Saw, 5 h.p.; 18in. Circular Ssw, 6½ h.p.; 24in. Circular Saw, 10 h.p.; 30in. Band Saw, 2-3 h.p.; 12x 5in. Tenoning Machine, 5 h.p.

Wood Turning Lathe, 6in. centres, ¾ h.p.; 8in. centres, 1 h.p.; 10in. centres, 1½ h.p.

ELECTRICAL OXY-ACETYLENE MELTING AND SPRAYING PLANT.

METAL SPRAYING.



The Schoop Metal Spray Process is a method of applying metallic coatings to surfaces for prevention of corrosion or for ornamentation, using zinc, lead, brass, copper, tin, aluminium, bronze, nickel, monel, &c., as desired.

The applied metal in wire form is fed through an oxy-acetylene flame where it is melted, atomised and sprayed, the whole of the operation being performed in a patented spraying pistol operated by electric power or compressed air.

The Metalsprayer, weighing three and one-half pounds, is connected to standard acetylene and oxygen cylinders and to a supply of compressed air, consuming, while in use, approximately fifteen cubic feet each of the gases per hour, and fifty cubic feet per minute at 50 pounds pressure of the air.

Metallic structures are first cleaned by sandblasting before being metal sprayed.

This process is not to be confused with spraying of bronze powders suspended in lacquers.

Principal building uses are zinc spraying structural steelwork, steel sashes, water tanks, ventilating equipment.

Bronze spraying steel sashes, lift cages and enclosures, grilles, ballustradings and ornamental ironwork.

Metal Spraying Prices for Zinc.

Plate work, 1/– to 2/– per square foot.
Light Structural Steelwork, 20/– to 30/– cwt.
Heavy Structural Steelwork, 15/– to 20/– cwt.
Prices of other metals on application.
Process is controlled throughout Australia by Alumino-Thermic & Metal Sprayers Ltd., Sydney.
See advt., p. 27.

ELECTRIC SUPPLY STATIONS

Throughout Australia where electricity is available for Lighting or Power for CONTRACTOR'S USE.

In Suitable Choice of Electric Motors installed on site to suit the Voltage and Current.

A — Alternating Current ; D — Direct Current ; Figures — Voltage or power.

(Extract from Tait's Electrical Directory, 1925).

New South Wales:

Albury	415/240 A	Camelia	415/240 A	Depiliquin	340 D
Armidale	415/240 A	Campbelltown	415/240 A	Dorrigo	415/240 A
Austinmer	415/240 A	Canberra	415/240 A	Dubbo	415/240 A
Ballina	480/240D	Canowindra	240 D	Dundas	415/240 A
Barraba	240 D	Canley Vale	415/240 A	Duntroon	415/240 A
Bathurst	415/240 A	Cabramatta	415/240 A	Dungog	240 D
Batlow	Private Supply	Carrington	415/240 A	East Greta	415/240 A
Baulkham Hills	450/241 A	Casino	Proposed	Estellville	Collieries Sup.
Bellambi	415/240 A	Cessnock	415/240 A	Fairfield	415/240 A
Bellbird	415/240 A	Clifton	415/240 A	Faulconbridge	415/240 A
Berrigan	415/240 A	**Cobar**	480/240 D	Gilgandra	240 D
Berry	460/230 D	Coffs Harbour	240 D	Glen Innes	415/240 A
Blackheath	415/240 A	Collaroy	415/240 A	Gloucester	415/240 A
Blayney	Erection	Concord	Sydney Supply	Gosford	415/240 A
Bombo	415/240 A	Coolamon	In Construction	**Goulburn City**	415/240 A
Boolaroo	250 D	Cooma	240 D	**Ditto. Suburbs**	480/240 D
Bowral	415/240 A	Coonamble	480/240 D	**Grafton**	415/240 A
Branxton	Ea Greta	Coraki	415/240 A	Greta	415/240 A
Broken Hill	200/115 A	Corowa	400/240 D	Gulgong	415/240 A
Brookvale		Cowra	415/240 A	Gunnedah	480/240 D
Bulli	415/240 A	Cronulla	418/240 A	Harden	415/240 A
Bulwarra	W. Maitland	Crookwell	240 D	Hay	400/230 A
Burrawa	Private	Culcairn	Stockman & Co.	Helensburg	415/240 A
Byron	Proposed	Dapto	415/240 A	Henty	240 D

LITTLE GIANT ELECTRIC HAMMER DRILL.

Equipped with universal interchangeable motor for operating 220 or 110 volts. **Alternating** or **direct** current.

For **Drilling** in **concrete** or **soft stone,** as well as light chipping of metals; for preparing door and window openings for metal, wood, or other frames.

Equipment, 10 feet of cable. 2 drills ties, with holder and rotating wrench.

Comparison, holes drilled in 30 seconds to 40 minutes for the same job by hand. Price £60

NEW SOUTH WALES—*continued.*

Holbrook ... 230 D
Holmesville
Caledonian Collieries
Hornsby ... 450/240 A
Inverell ... 480/240 D
Jerilderie In Construction
Junee ... 415/240 A
Kandos ... 220 A
Katoomba ... 415/240 A
Kempsey ... 480/240 D
Kenmore ... 415/240 A
Kiama ... 415/240 A
Kurri Kurri ... 415/240 A
Kyogle ... 240 D
Lawson ... 415/240 A
Leeton... ... 415/240 A
Lismore ... 240 D
Lithgow ... 415/240 A
Leura ... 415/240 A
Lockhart ... 240 D
Maitland ... 415/240 A
Manilla ... 480/240 D
Manly ... ... 415/240 A
Merewether ... 415/240 A
Merrylands ... 415/240 A
Milton ... 110 D
Mittagong ... 415/240 A
Moree ... 240 D
Moss Vale ... 415/240 A
Mt. Victoria ... 415/240 A
Mudgee ... 240 D
Mullumbimby 415/240 A
Murrumburrah 415/240 A
Murwillumbah 415/240 A
Muswellbrook... 415/240 A
Narrabeen ... 415/240 A
Narrabri ... 480/240 D
Narrandera ... 460/230 D
Newcastle ... 415/240 A

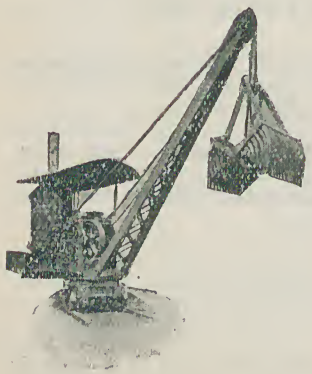
For Details, *see* Tait's Directory.

Nymboida ... 415/240 A
Orange ... 415/240 A
Parkes ... 415/240 A
Parramatta ... 415/240 A
Penrith ... 415/240 A
Picton ... 480/240 D
Port Kembla ... 400/230 A
Portland ... 400/230 A
Prospect ... 415/240 A
Queanbeyan ... 415/240 A
Richmond ... 415/240 A
Scone ... ... 480/240 D
Singleton ... 415/240 A
Speer's Point 200 D
Springwood ... 415/240 A
Sutherland ... 415/240 A
Sydney and Suburbs ... 415/240 A

For Details, *see* Tait's Directory.

Tamworth ... 415/240 A
Taree ... ... 240 D
Tarro ... ... 415/240 A
Temora ... 480/240 D
Tenterfield ... 240 D
Tocumwal ... 415/240 A
Tumut... ... 415/240 A
Tweed Heads 240 D
Ulmarra ... 415/240 A
Unanderra ... 415/240 A
Uralla ... 240 D
Wagga... ... 415/240 A
Walcha Installed
Walla Walla ... 230 D
Wallsend ... 415/240 A
Warren ... Installed
Warringah ... 415/240 A
Wellington ... Installed
Wentworthville 415/240 A
Werris Creek ... 415/240 A
West Maitland 415/240 A
Weston ... 275/250 D
West Wyalong 480/240 D
Windsor ... 415/240 A
Wingham ... 240 D
Wollongong ... 415/240 A
Yanco ... 415/240 A
Young ... 480/240D

Note: Many more Districts have been supplied since 1925, but the above list is as far as could be ascertained, so for other towns please enquire from adjacent towns where systems are installed.—C. E. MAYES.



Electric Travelling Grab.
Crane, with 20 cubic feet grab. 18ft. radius. Free delivery Sydney, £1150.

Steam Travelling Grab Crane, with 20 cubic feet Priestman's grab, 18 feet radius.
£1350.

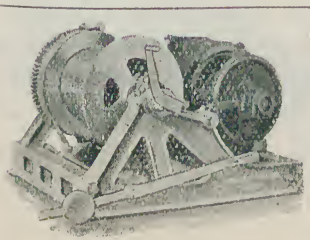
For particulars, *see advt., p.* 19.

Victoria.

Alexandria ... 230 D
Ararat ... 415/240 A
Aspendale ... 460/230 A
Avoca Prosposed
Bacchus Marsh 400/230 A
Bairnsdale ... 460/230 D
Ballarat ... 440/220 D
Barwon Heads 360/230 A
Beeac ... 640/230 A
Belgrave ... 230 A
Bellarine ... 400/230 A
Benalla ... 400/230 A
Bendigo ... 440/220 D
Beulah ... 460/230 D
Birchip ... 230 D
Birrigarra ... 460/230 A
Boort ... ... 230 D
Boolarra ... 460/230 A
Boxhill ... 400/200 A
Braybrook ... 230 D
Brighton Melbourne Sup.
Buln Buln ... 400/230
Camberwall Melbourne Sup
Camperdown ... 400/230 A
Carum ... 460/230 A
Carnarvon ... 460/230 A
Casterton ... 230 D
Castlemain ... 460/230 D
Charlton ... 230 D
Chelsea ... 460/230 A
Chesterham Melbourne Sup.
Chiltern ... 230 D
Cobden ... 400/200 A
Cobram ... 230 D
Coburg ... 400/230 A
Cohuna ... 230 D
Colac ... ... 400/230 A
Coleraine ... 230 D
Collingwood Melbourne Sup
Corio ... 400/230 A
Cororooke ... 460/230 A
Cow-warr ... 460/230 A
Dandenong ... 400/230 A
Daylesford ... 460/230 D
Dimboola ... 460/230 D
Donald ... 230 D
Doncaster ... 400/200 A
Drouin ... 400/200 A
Drysdale ... 460/230 A
Eaglehawk ... 460/230 D
Echuca ... 400/230 A
Elmore ... 460/230 D
Essendon ... 400/230 A
Euroa ... ... 230 D
Fern Tree Gully 230 A
Flemington ... 400/230 A
Footscray ... 400/230 A
Forest Hill ... 400/200 A
Foster ... 415/240 A
Frankston ... 460/230 A
Geelong ... 400/230 A
Gisborne ... 230 D
Hamilton ... 460/230 A
Healesville ... 400/230 A
Heathcote ... 230 D
Heidelberg ... 400/200 A
Hayfield ... 400/230 A
Hopetoun ... 230 D
Horsham ... 460/230 D
Inglewood ... 230 D
Jeparit ... 230 D
Kaniva Installing
Kerang ... 230 D
Kew Melbourne Supply
Kilmore ... 230 D
Kilsythe ... 460/230 A
Koroit ... 230 D
Korumburra ... 400/230 A
Kyabram ... 460/230 D
Kyneton ... 400/230 A
Leongatha ... 400/230 A
Lilydale ... 460/230 A
Lorne ... 110 D
Maffra ... 400/230 A
Mansfield ... 230 D
Maryborough ... 400/230 A
Melbourne ... 400/200 A
Melbourne and Suburbs ... 400/200 A

For Details, *see* Tait's Directory.

Mildura ... 460/230 D
Minyip ... 230 D
Mirboo North... 400/230 A
Moe ... ... 400/230 A
Mt. Albert ... 400/200 A
Montrose ... 460/230 A
Mooroopna ... 230 D
Mornington ... 460/230 A
Mortlake ... 400/230 A
Moorwell ... 400/230 A
Murrayville ... 32 D
Murtoa ... 230 D
Nagambie ... 230 D
Nathalie ... 460/230 D
Neerim ... 400/230 A
Newport Melb. Elect. Rys.
Nhill ... ... 460/230 D
Noogee ... 400/230 A
Noorat ... 400/230 A
Northcote ... 400/200 A
Numurkah ... 230 D
Nuna Wading 400/230 A
Ocean Grove 460/230 A
Orbost ... 230 D
Ouyen ... 110 D
Port Lonsdale 460/230 A
Portarlington 460/230 A
Port Melbourne 400/230 A
Portsea ... 230 D
Preston ... 400/200 A
Queenscliff ... 400/230 A
Rainbow ... 230 D
Rochester ... 230 D
Rupanyup ... 230 D
Rushworth ... 230 D
Rutherglen ... 460/230 D
Sale ... ... 400/230 A
Sea-lake ... 230 D
Seymour ... 400/230 A
Shepparton ... 460/230 D
Sorrento ... 230 D
S'Arnold ... 400/230 A
Stawell ... 400/230 A
Sunbury ... 230 D
Sunshine ... 230 D
Swanhill ... 400/230 A
Tatura... ... 230 D
Terang ... 400/230 A
Toora ... 415/240 A
Trafalgar ... 400/230 A
Taralgon ... 400/230 A
Trentham ... 400/230 A
Tyers District 460/230 A
Wangunyah 240 D
Wangaratta ... 400/230 A
Warburton ... 230 D
Warragul ... 400/230 A
Warrion ... 400/230 A
Warrnambool... 400/230 A
Watchem In Contemplation
Werribee ... 400/230 A
Williamstown... 400/230 A
Winchelsea ... 460/230 A
Wodonga ... 230 D
Wonthaggi ... 415/240 A
Woodend ... 230 D
Wycheproof ... 230 D
Yallourn ... 400/230 A
Yarragon ... 400/230 A
Yarram ... 400/230 A
Yarrawonga ... 230 D



HOIST, ELECTRIC DRIVEN.

Used for rapid hoisting of concrete.

Heavy duty type to eighth storey. Capacity 2000 lbs. at 300 ft. per minute.

Price from £85.

For fuller particulars and sizes, *see advt., pp.* 7, 13, 14, 19.

Queensland, South Australia, Western Australia.

QUEENSLAND.

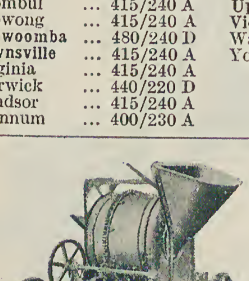
Ayr	...	440/220 D
Balmoral	...	400/230 A
Barcaldine	...	240 D
Blackall	...	240 D
Boonah	...	220 D
Bowen	...	415/240 A
Brisbane and Suburbs	...	440/240 A
Bundaberg	...	440/220 D
Caboolture		Proposed
Cairns ...	...	415/240 A
Castle Creek	...	Private
Charleville	...	480/240 D
Childers	...	220 D
Coolangatta	...	415/240 A
Corparoo	...	400/230 A
Dalley	...	440/220 A
Gayndah	...	240 D
Gladstone	...	480/240 D
Goondiwindi	...	240 D
Gympie	...	440/220 A
Hamilton	...	415/240 A
Hendra	...	415/240 A
Home Hill	...	440/220 A
Ipswich	...	415/240 A
Kingaroy	...	480/240 D
Longreach	...	480/240 D
Mackay	...	415/240 A
Maryborough		415/240 A
Nundah	...	415/240 A
Rockhampton Gas Co.	...	110 D
Rockhampton City Council		415/240 A
Roma	...	220 D
Sandgate	...	415/240 A
Sherwood	...	415/240 A
Southport	...	500/250 D
Stanthorpe	...	415/240 A
Stephens	...	415/240 A
Taringa	...	415/240 A
Thargomindah		220 D
Toogoolawah Nestles Milk Co.		415/240 A
Toombul	...	415/240 A
Toowong	...	415/240 A
Toowoomba	...	480/240 D
Townsville	...	415/240 A
Virginia	...	415/240 A
Warwick	...	440/220 D
Windsor	...	415/240 A
Wynnum	...	400/230 A

SOUTH AUSTRALIA.

Adelaide and Suburbs	...	400/200 A
Agaston		Adelaide Supply
Balaclava	...	460/230 A
Bordertown	...	415/240 A
Brighton		Adelaide Supply
Burra enruire voltage		A
Clare		Mid North E.C. A
Crafers		Adelaide Supply
Crystal Brook		415/240 A
Daveyston		Adelaide Supply
Gawler		Adelaide Supply
Gilbert		*See* Clair
Glenelg		Adelaide Supply
Grange		Adelaide Supply
Greenock	...	400/200 A
Hanley Bridge		200 D
Jamestown	...	460/230 D
Kadina	...	240 D
Kensington		A.E.S. Co
Laura	...	220 D
Littlehampton		400/230 A
Loxton	...	440/220 D
Maitland	...	230 2 Wire D
Mannum	...	200 D
Millicent	...	240 D
Minlaton	...	230 D
Moonta	...	230 D
Mt. Barker	...	400/230 A
Mt. Gambier		460/230 D
Mt. Lofty	...	400/200 A
Murray Bridge		460/230 D
Naracoorte	...	440/220 A
Norwood	...	400/200 A
Nuriootpa	...	400/200 A
Orroroo	...	240 D
Peterborough		460/230 D
Port Augusta		440/220 D
Port Pirie	...	400/230 A
Quorn ...	...	230 D
Renmark	...	460/230 D
Strathalbyn	...	220 D
Tanunda	...	220 D
Upper Wakefield		Mid
Victor Harbour		415/240 A
Wallaroo	...	220 D
Yorketown	...	220 D

WEST AUSTRALIA.

Albury	...	200 A
Applecross	...	440/250 A
Armidale	...	
Bassendean	...	440/215 A
Belmont	...	440/250 A
Beverley	...	200 D
Boulder	...	440/220 D
Boya	...	440/250 A
Bridgetown	...	440/220 D
Bunbury	...	440/220 D
Busseltown	...	220 D
Casinsigton	...	440/250 A
Claremont	...	440/250 A
Collie ...	...	500/250 D
Cottesloe	...	440/250 A
Darlington	...	400/250 A
Fremantle	...	440/250 A
Geraldtown	...	440/220 D
Nowangerup	...	110 D
Goomalling	...	230 D
Gooseberry Hill		440/250 A
Gosnells	...	440/250 A
Greenmount	...	440/250 A
Guildford	...	440/250 A
Kalamunda	...	440/250 A
Kalgoorlie (Municipal) (E. P. & L. Corpn.)	...	440/220 D 550/220 A
Katanning	...	220 D
Kellerberrin	...	220 D
Kalmscoff	...	440/250 A
Kenwick	...	440/250 A
Kojonup	...	110 D
Leonora	...	440/220 D
Maddington	...	440/250 A
Meckering	...	110 D
Merredin	...	220 D
Middle Swan		440/250 A
Midland Junc.		440/250 A
Minginew	...	110 D
Moora ...	...	220 D
Mt. Magnet	...	110 D
Narrogin	...	220 D
Northam	...	440/220 D
N. Fremantle		440/250 A
Peppermintg've		440/250 A
Perth ...	...	440/250 A
For Details, *see* Tait's Directory.		
Queens Park		440/250 A
Rottnest	...	110 D



CONCRETE MIXERS FOR BUILDERS.

One Bag Mixer. Capacity 7 cubic feet. 8 to 14 cubic yard per hour. 5 : 2½ : 1 mixture.

Worked by **Electric Motor** or oil-engine drive.

Portable or stationary, with batch hopper or power loader.

Price, £115.

Western Australia and New Zealand.

WEST AUST.—*cont.*

Southern Cross 220 A
South Guildford 440/250 D
South Perth ... 440/250 A
Subiaco ... 440/250 A
Toodyay ... 220 D
Wagin ... 220 D
Wattle Grove 440/250 A
Welshpool ... 440/250 A
Wickepin ... 110 D
Westonia ... 220 D
Whyleatchem... 220 D
Yalgoo ... 110 D
York ... ... 220 D

NEW ZEALAND.

Akaroa ... 230 D
Arapuni ... 460/230 D
Ashburton ... 460/230 D
Auckland ... 460/230 D
For Details, *see* Tait's Directory.
Banks Peninsula 400/230 A
Bluff ... ... 460/230 D
Brightwater 230 A
Buller Power Bd. enquire
Bulls ... ... 230 D
Cambridge
Elect. Power Bd. 400/230A
Central Power Board ... 400/230 A
Central Hawkes Bay enquire
Christchurch ... 400/230 A
460/230 D
For Details, *see* Tait's Directory.
Dannevirke ... 400/230 A
Davenport ... 460/230 A
Dunedin ... 400/230 A
For Details, *see* Tait's Directory.
Eyre ... ... 400/230 A
Fairlie ... 400/230 A
Feilding ... 230 A
Gisborne ... 460/230 D
Gore ... ... 400/230 A
Grey p.b. enquire volts
Halswell ... 400/230 A
Hamilton ... 400/230 A
Hastings ... 460/230 D
Havelock ... 400/230 A
Hawera ... 400/230 A
Hawkes Bay p.b. enquire volts
Heathcote ... 400/230 A
Hobsons Bay electric p.b. enquire volts
Hokitika ... 400/230 A
Horahora power station enquire
Horowhenua p.b. enquire
Huntly ... 460/230 D
Hutt Valley power board
Inglewood ... 400/230 A
Invercargill ... 400/230 A
Kaiapoe ... 400/230 A
Kaikoura ... 400/230 A
Kaipara p.b. enquire
Kaitangata ... 400/230 A
Kaponga ... 400/230 A 230 D
Kowai ... 400/230 A
Lake Coleridge
For Details, *see* Tait's Directory.
Lyttleton ... 400/230 A
Malvern p.b. enquire
Manawatu Orono P.B.
Mangahao P. Station
Mangaweka ... 400/230 A
Marlborough P.B.
Martinborough 230 D
Mataura ... 440/220 A
Motueka ... 400/230 A
Murchison ... 400/230 A
Napier ... 460/230 D
Nelson ... 400/230 A
New Plymouth 400/230 A
Ohakune ... 400/230 A
Opotiki ... 460/230 D
Opunakei P.B. 400/230 A
Otago P.B.
Palmerston N. 400/230 A
Pukekohe ... 400/230 A
Patea ... ... 100 A
Picton ... 460/230 D
Poverty Bay Co.
Pukekohe ... 400/230 A
Raetihi ... 400/230 A
Rangiora ... 400/230 A
Reefton ... 230 D
Riccarton ... 400/230 A
Rotorua ... 200/115 A
S. Canterbury Southland P.B. 400/230 A
Springs Ellesmere P.B. ... 400/230 A
Stratford ... 250/110 A
Sumner ... 400/200 A

MULTIMIX CONCRETE MIXER.

(Electric Driven.)

On Wheeled Platform.

3½ cubic feet capacity, £115.
output 30 cubic yards per hour.
7 cubic feet, batch capacity, £300.

See advt. pp. 7, 13, 14, 19.

New Zealand, Tasmania, Papua.

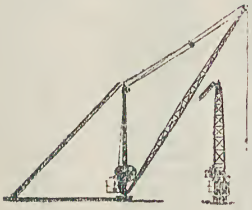
N. ZEALAND—*cont.*

Taihape ... 460/230 D
Tai Tapu ... 400/230 A
Tamaki West 400/230 A
Taradale ... volts.
Taranaki ... P.B.
Tararua P.B. 230 D
Taumarunui ... volts
Tauranga ... 400/230 A
Te Aroha ... 400/230 A
Te Awamutu P.B. ... 400/230 A
Te Puka ... 400/230 A
Te Kuiti ... 460/230 D
Teviot ... P.B.
Thames ... 400/230 A
Timaru ... 400/230 A
Tolaga Bay ... 230 D
Waikare Mt. ...
Waimairi ... 400/230 A
Wairarapa P.B. 400/230 A
Wairoa ... 400/230 A
Waiuko ... 400/230 A
Wanganui ... 400/230 A
Wellington ... 100/500 D
400/230 Y
Westland P.B. 400/230 A
Whakatane ... 400/230 A
Whangarei ... 400/230 A
Winton ... 400/230 A
Port Moresby, Papua ... 400/230 A
Suva, Fiji ... 480/240 D

TASMANIA.

Bothwell ... 400/230 A
Bridgewater ... 418/230 A
Burnie ... 460/230 D
Cascades Hobart Supply
Casino Hobart Supply
Cygnet ... 405/240 A
Deloraine ... 220 D
Devonport ... 400/230 A
Franklin ... 220 D
Gormanstown 230 A
Hobart and Suburbs ... 415/240 A
Kingston ... 450/240 A
Lake Marg aret 220 A
Latrobe ... 460/230 D
Launceston and Suburbs 415/240 A
... 119/110 A
Linda ... 230 A
Lidisfarne ... 415/240 A
Longford ... 480/240 D
Margate ... 450/240 A
New Norfolk 415/240 A
Queenstown ... 220 A
Scottsdale ... 415/240 A
Stanley ... 415/240 A
Ulverstone ... 400/230 A
Wynyard ... 460/230 D
Zeehan Mt. Lyall Ry.

CONTRACTORS' PLANT.



Steam Derrick Cranes, 10% more than electric. Stays and sleepers, rope complete.

5 ton, £980.

Electric 30 cwt. crane, 40ft. timber jib, stays and sleepers, rope complete, £485.

2 ton (40 cwt.) crane ditto, £535.

3 ton 70 ft. steel jib, £790.

See advt., p. 19.

AUSTRALIAN ELECTRIC SUPPLY STATIONS CHARGES.

Extract from Tait's Electrical Directory, 1925, which would give special valuable information. Price, 7/6.

CHARGES FOR ELECTRIC CURRENT, LIGHTING AND POWER, 1925.

ADELAIDE—
Lighting, up to 500 units, per month, 7¼d., beyond 500, 4¼d.
Power, up to 500 units per month, 3¼d., next 2,000, 2d., and next 50,000, 1d.

ALBANY—
Lighting, first 100 units per month, 9d., after 8d. Power, first 100 units per month, 7d., after, 6d.

ARMIDALE—
Lighting, 10d., power, 4d., with Sliding Scale for motors over 2 h.p.

BALLARAT—
Lighting flat rate, 9d., max. demand, 9d. for first 60 hours' use, 5d. after. Power, 3½d. for first 38 hours' use, per month, after, 1½d.

BATHURST, N.S.W.—Lighting, 7d., Power, 3½d.

BENDIGO, VIC.—Lighting, 9d., Power, 4d.

BRISBANE, Q.—Lighting, 6d., Power, first 200 units, 3d., and over 600, 2¼d.

CHARLEVILLE, Q.—Lighting, 1s. 6d., Power, 6d.

GEELONG—Lighting, 8½d. for first 50 hours' use per month, beyond, 4d. Power, 4½d. for first 50 hours' use per month, beyond 2d.

GOULBURN—Lighting, 6d., Power, 3d. to 1d.

GRAFTON—Lighting, 7d., Industrial Power, 3½d. to ½d.

HOBART, TASMANIA—Lighting, 5d. to 3d., Power, 2d. to ½d.

LAUNCESTON, TAS.—Lighting, 6d., Power, 2d. to ½d.

MELBOURNE, VIC.—Lighting, 3½d., Sliding Scale, to 2d., Power, 1¾d. to 0.6d.

NEWCASTLE—
Lighting, first 500 units per month, 4d. to 3d., Power, 2d. to ½d.

NORTH FREMANTLE, W.A.—
Lighting, 6d. to 3½d., Power, 5d. to 1d.

PERTH, W.A.—
Lighting, 4d. to 3d., Power, 2d. to 1d.

SYDNEY—
Lighting flat rates, 4¾d. to 2¼d., Commercial Rate, primary 500 units, 5d., above that quantity, 1¼.
Power flat rate, 1.7d. per unit.
Sliding scale from 1·5d. to 0·6d, per unit according to quantity.

TAMWORTH—
Lighting, 6d., Power, 2½d. to 1d.

GLAZIER.

Glass is measured by the superficial foot, and the glazing is generally done by the firm supplying the glass. The following prices include glazing and putty.

Ordinary curved plate glass is charged according to size, from 20 per cent. extra.

Glazier, 2/9 per hour. Putty, per cwt.

	per ft. super. s.	d.
¼in. Polished Plate—Up to 7 sq. feet	3	3
Up to 10 feet super.	3	5
10 to 25 ,, ...	3	6
25 to 50 ,, ...	3	8
50 to 60 ,, ...	4	0
60 to 75 ,, ...	4	6
Special Prices for larger sizes.		
Polished $\frac{3}{16}$in. Plate, additional	0	3
Ground Plate, additional	1	0
Sheet Glass—		
16 oz., up to 50 sq. in., 6d., to 60, 7d., to 70, 8d.... ...	0	3½
21 oz., up to 50 sq. in., 8½d., to 60, 9d., to 70, 10½d., to 80, 1/1, to 90	1	5
26 oz., add 3d. to above 21 oz.		
32 oz., add 6d. to 21 oz. per foot.		
Plain Colors, Blue, Ruby and Green	0	9½
21 oz. Figured Rolled (Chances, "G" and large and small Muranese)—		
White artic	1	2
Tinted	1	6
Cathedral	1	6
Muffled	2	0
Flemish Glass and Tinted	2	0
Rough Rolled and Rough Cast, ⅛in., 1/– ; $\frac{3}{16}$in., 1/2 ; ¼in....	1	3
Wired Rolled, one width only, viz., 24in. ; lengths up to 9ft.	1	6

LARGEST SIZES OF SHEET GLASS MANUFACTURED.

Weight of per sq. foot. oz.	Length.	Width	Area in sq. ft.
16	48	40	about 13
21	70	50	24
26	70	50	24
32	66	44	20

40oz. on application, being special weight.

WEIGHT OF ROUGH GLASS PER SQUARE FOOT.

Thickness, ins.	⅛	$\frac{3}{16}$	¼	⅜	½	⅝	¾	1
Weight, lbs.	2	2½	3½	5	7	8½	10	12½

¼ **Plate Glass,** weighs 4lbs. per square foot.

$\frac{3}{16}$**in. Corrugated Rough Rolled,** 72 x 27, per sheet, 4/6 super. ft.

LABOR GLAZING SASHES.

The average prices.

Glazing sashes including priming (wages at 2/6)—	Per light. From	To
	s. d.	s. d.
10in. x 14in. and under	0 4	0 6
10in. x 16in. ,, ...	0 10	1 0
14in. x 24in. ,, ...	1 0	1 6
24in. x 30in. ,, ...	1 6	2 0
36in. x 40in. ,, ...	2 0	3 0

SILVERED PLATE.

	per sup. ft. s. d.		per sup. ft. s. d.
Up to 1 foot super. ...	4 0	7 to 8 feet super. ...	5 6
Up to 3 feet super. ...	4 6	8 to 10 feet super. ...	5 9
Up to 5 feet super. ...	4 9	10 to 12 feet super. ...	6 0
5 to 6 feet super. ...	5 0	12 to 20 feet super. ...	6 3
6 to 7 feet super. ...	5 3	20 to 40 feet super. ...	6 6

See advt., page 22.

Standard Pat. Glazing Bar (Sydney File Co.), 4/– per lin. ft.

BEVELLING.

Wide	¾in.	1in.
Up to 10 feet	0 6	0 9
,, 15 ,, ...	0 9	1 0
,, 20 ,, ...	1 0	1 3
,, 25 ,, ...	1 6	1 9
,, 30 ,, ...	2 6	2 9

Curved Edges Special Prices.

LABOUR.

Glazing and **Cutting**, per sq. ft. upwards, 1d.
Polishing edges, plate glass, under ⅜in. thick, from 8d. per foot run.
Drilling holes in Plate Glass, up to ¼in. diameter, 6d. each; ½in., 1/–.
Silvering only to Plate Glass, at owner's risk—

	s. d.
Up to 3 feet sup.	1 6
3 to 10	1 9
10 to 20	2 0
20 to 40	2 6

CUTTING GLASS GAUGE TUBES.

The proper way is to take the point of small file and simply scratch the inside of the tube all round at the part you want it cut, and if the piece does not fall off in your hand at once, lay it aside for a little and you will find it as you want it in a very short time.

LEAD LIGHT WORK.

	sup. foot.
Plain sheet, and obscured, in quarries or squares ...	2 0 to 3 0
General domestic work, tinted cathedral, according to design	30 6 to 8 0
Special work and design	10 0 to 20 0
Gothic cathedral and church	20 0 to 30 0
Best figure and gothic work, up to	40 0

Above fixed to stonework or steel frames.

Pointing in grooves in mastic, per foot run, 4d.

Recipe to Remove Old Glass from Sashes.

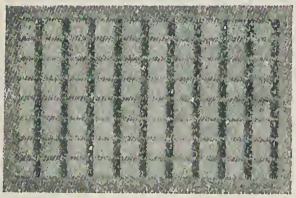
Run a hot soldering iron (or other hot metal) along surface of putty to soften same, then scrape with knife or chisel.

HAYWARD'S OR HYATT'S PATENT PRISMATIC LIGHTS.

Colonial Manufacture.

PRISMATIC LIGHTS FOR PAVEMENTS, STALLBOARDS AND ROOFS.

Colonial Manufacture.



The lenses and prisms are fitted in the pockets with improved patent mastic putty, thus avoiding lamination through contraction of the iron frames.

The frames are cast locally from the best imported iron.

The glass is the best imported English make, the same as that used by the makers of the highest class pavement lights.

	per s. foot.
Semi Prism, 20 x 3	18/6
All Lenses	18/–
Stallboard Lights	18/6

Builder to fix frame ready for glazing.

Ventilating squares inserted without extra charges.

Skylights (Malley's) Sizes :	6ft.	7ft.	8ft.	9ft.	10ft.
Fixed	29/6	30/6	31/–	34/–	35/–
Opening, with stay complete ...	37/–	38/–	38/6	41/6	42/6

Glazed with $\frac{3}{16}$in. Mill Rolled Glass, size 3ft. 6in. x 18in. wide.

See advt., p. 29.

INDIA RUBBER.

Corrugated and Pyramid Rubber Matting.

For Shop Doorways, Treads, Bathrooms, Landings.

Sheets, 3ft. wide, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$in. thick. Pyramid, $\frac{1}{8}$in. only.

Weight of rubber varies according to quality quoted, but the general average:—$\frac{1}{8}$in. thick = 1lb. per sq. ft., $\frac{3}{16}$in. thick = 1½lb. per sq. ft., $\frac{1}{4}$in. thick = 2lbs. per sq. ft. **Price**, 2/– per lb.

Sheet rubber, plain or metallic, $\frac{1}{32}$in. to $\frac{3}{16}$in. thick, 3/9 to 4/– per lb.

Perforated Door-mats, $\frac{3}{8}$in. thick = 2lbs. per sq. ft., or 24in. x 18in. mat = 6lbs., at 2/– per lb. = 12/–.

Lettered and special mats, 2/6 per lb.

"Rublino" Rubber Tiling in ornamental designs and colours, for Corridors, Bathrooms, $\frac{1}{4}$in. thick, per sq. ft., 10/6.

Draught Tuting for air-tight chambers, with canvas flange attachment—$\frac{3}{16}$in., 3/–, $\frac{1}{4}$in., 3/9; $\frac{5}{16}$in., 3/6; $\frac{3}{8}$in., 5/9.

INDIA RUBBER HOSE.

Hose measurements always internal diameter.

Internal diameter.	in. ¾		in. 1		in. 1¼		in. 1½		in. 2		in. 2	
Canvas delivery hose, per yd.	0	6	0	7	0	10	1	0	1	3	2	0
India Rubber delivery hose, 3 ply, superior, per ft. ...	1	3	1	8	2	0	2	6	3	9	6	6
India Rubber Suction Hose, 3 ply, per ft.	1	6	1	10	2	3	2	8	3	6	5	4
Spiral Steel Armour for any of above, extra per ft. ...	0	1½	0	2	0	2½	0	3	0	5	0	9

Air and Rock Drill Hose, 4 ply, ½in., 1/8; ⅝in., 1/10; ¾in., 2/–; 1in., 2/6.

Diving Hose, sinking or floating, ⅝in., per ft. run, 3/–; heavy, 4/–.

Diaphragm Pump Valves—Douglas pump, No. 1, 15/–; No. 2, 17/6

Edson, Star or Gould pump, No. 2, 25/–; No. 3, 30/–.

Gum Knee Boots, for wet sinking, from 37/6 per pair.

Rubber Gloves, for electricians' use—short, 12/6; gauntlet, 20/–.

Tuting for Gas—No. 1 quality, $\frac{3}{16}$in. (inside diameter), 4d.; ¼in., 6d.; ⅜in., 8d.; ½in., 11d.; ¾in., 1/5; 1in., 2/9; 1¼in., 4/– per ft.

Vulcanised or mineralised India Rubber weighs from 6 to 9lbs. per super ft., 1in. in thickness; this diversity in the weight is owing to the quantity of sulphur incorporated, which varies according to the purpose for which it is applied.

Diving Apparatus complete in the Australian cities from £150 to £200.

IRONWORKER AND SMITH.

MEASUREMENT.

All Smiths' and Cast Work is measured and generally valued by weight. The work should be measured in detail, and the weight ascertained by reference to the various tables given, or by roughly allowing 465lbs. to the foot cube. The patterns for castings are charged extra. The weight of castings may be ascertained from weight of pattern multiplied by table of constants as under for different metals. All screws and bolts—holes drilled, &c., should be *numbered.* Heavy castings should be kept separate from light or ornamental work.

Crestings and railings, &c., are usually taken by *the foot run.*

All work that has to be hoisted must be kept separate and charged for according to handling and height to be raised.

Wrought iron or steel framing work is also measured and charged by weight; all hoisting to be treated as above described. In the case of iron-framed roofs and R.S. joist framing the weight is generally taken and valued according to the amount of work in executing same. In smiths' work, such as railings, guard-bars to windows, &c., the plan is frequently adopted of giving the weight of the metal, reckoning all the labors in addition.

Light Grill and **Open** or **Mesh Work** Panel Work for Elevators, Gates, Staircases and Lift Wells are generally reckoned by the super foot.

Steel Windows and **Casement Frames** by the opening. Rolled steel mesh work generally by the super foot according to work.

MEMORANDA.

Test for Iron.—A soft tough iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

Badly refined iron gives a short blackish fibre on fracture, a very fine grain denotes hard, steely iron, likely to be cold-short.

A medium, even grain, with denser fibres, shows good iron.

Coarse grain, with bright crystallised fracture, or discoloured spots, denotes cold-short, brittle iron, which works easily when heated, and welds well.

Cracks on the edge of a bar are indications of hot-short iron.

Good iron is readily heated, is soft under the hammer, and throws out few sparks.

Iron remains bright if touched with nitric acid.

Test for Steel.—Good steel in its soft state has a curved fracture and a uniform grey lustre; in its hard state a dull silvery uniform white.

Nitric acid will produce a black spot on steel; the darker the spot the harder the steel.

Cracks, threads, or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat, while at a middling heat it may be drawn out, under the hammer, to a fine point. Care should be taken that before attempting to draw it out to a point the fracture is not concave, and should it be so, the end should be filed to an obtuse point before operating. Steel should be drawn out to a fine point and plunged into cold water; the fractured point should scratch glass.

To test its toughness, place a fragment on a block of cast-iron; if good, it may be driven by the blow of a hammer into the cast-iron; if poor, it will crush under the blow.

Testing Girders.—The easiest and cheapest way to test girders in pairs is to dig a trench longer and wider than the girders, which are laid in the trench with sufficient space between them to insert an hydraulic lift in the centre, the ends being easily fixed with wooden blocks; by pumping to exactly the pressure required each girder is fully tested.

Approximate weight of Castings from the Pattern.—The weight of pattern in lbs. multiplied by *constants* given, will give the weight of casting in lbs. for the following metals:—

	C. Iron.	Zinc.	Brass.	Copper.	G. Metal.	Lead
White Pine or Deal, dry	14	15	18	19	19	25
Yellow Pine, dried ...	14	14	17.5	18	18	24
Clay dried (model) ...	4	3.8	4.4	4.6	4.6	6
Plaster of Paris, ditto	3.3	3.2	3.7	3.8	3.8	5

COST OF STEEL.

Per Single Pound at per Ton.

M. S. Stanley, C.E.

Cost per Ton £	Cost per Pound. Pennies	Cost per ton £	Cost per pound. Pennies
10	1.07	21	2.25
11	1.18	22	2.36
12	1.29	23	2.47
13	1.39	24	2.57
14	1.5	25	2.68
15	1.61	26	2.79
16	1.72	27	2.89
17	1.82	28	3.0
18	1.93	29	3.11
19	2.03	30	3.21
20	2.14		

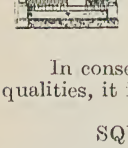
Average diff. per £1 = .11 pence.

WROUGHT IRON.

	From		To	
	s.	d.	s.	d.
Straps or T. hinges, with hooks and bolts	0	9	0	10
Screw bolts, nuts and washers, and king-post stirrups	0	8	0	9
Pile shoes, with straps and nails	0	6	0	9
Framed grating for sewers and sink-stones	0	6	0	8
Cradle bars, framed, 4d., ditto, trussed with screws and nuts	0	8	0	9
Gates, Ornamental, each hung, from			£5 0	0
Galvanising wrought iron, extra per cwt.	18	0	24	0

SPECIAL WROUGHT IRON WORK.

Gates, staircasing, per super. foot	9	0	upwards
Ornamental railings, for balconies, galleries, &c., per super. foot	10	6	„
Heavy railing or guard rails, for basement windows, and plain grills, per super. foot	9	0	„
Balusters, for staircases, each, ornamental, from ...	10	0	„
Ornamental wrought iron work, for grilles, railings, lift enclosures, &c., according to design, per sup. ft., from	10	0	„



Interlaced Iron Meshwork—	s	d.
For Lift enclosures, offices—all gauges, per super ft.		
1¼in. Plain mesh, ¼ x 1/20in. iron	5	0
1½in. „ ⅜ x 1/16in. „ from ...	3	6
1¾in. double strand ¼ x 1/20in.	5	9
1¼in. „ ⅜ x 1/16in. from ...	3	9

In consequence of the great variety of shapes, sizes, sections, and qualities, it is impossible here to quote prices in detail.

SQUARE AND ROUND IRON.—Per Foot Run.

at 2d. per lb., or 18/8 per cwt.

In.	Square.		Round.		In.	Square.		Round.		In.	Square.		Round.	
	s.	d.	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.
¼	0	0½	0	0½	1⅛	0	8½	0	7	2	2	3	1	9
⅜	0	1	0	1	1¼	0	10½	0	8½	2⅛	2	6	2	0
½	0	2	0	1½	1⅜	1	1	0	10	2¼	2	10	2	2½
⅝	0	2½	0	2	1½	1	3	1	0	2⅜	3	2	2	6
¾	0	4	0	3	1⅝	1	6	1	2	2½	3	6	2	9
⅞	0	5	0	4	1¾	1	8½	1	4	2⅝	3	10	3	0
1	0	6½	0	5	1⅞	1	11½	1	6½	2¾	4	2½	3	3

For varying prices, multiply or add to the above, viz., 3d. per lb., add 50 per cent.; 4d. per lb. x by 2; 5d. per lb., multiply by 2½ times: 6d. x 3 for each kind, square or round.

COLLAPSIBLE STEEL GATES AND SHUTTERS.

For shops fronts, entrances, lift doors, &c., of public, private, or business premises ; expanded measurement per sup. ft. :—

Gates manufactured of ½in. channel steel.

		s.	d.
Area up to	35 sq. ft.	10	6
,,	50 ,, ...	9	6
,,	70 , ...	8	6
,,	100 ,, ...	8	0

If Gates ⅝in. channel section, add 1/– per sup. ft. to above prices, if hinged, 1/2.

Standards complete with socket pieces, dust covers and necessary stays, each 35/–.

Weight of Gates, ½in. channel, 4lbs. per ft. ; ⅝in. channel, 5lbs. per ft.

SPACE CERTAIN SIZE GATES WILL OCCUPY WHEN COLLAPSED. For Small Openings or Window Guard.

½in. Pickets at 4½in. Spacing		⅝in. Pickets at 4½in. Spacing	
Size	Collapsed	Size	Collapsed
Ft. Ins.	Ins.	Ft. Ins.	Ins.
2 1½	3¼	2 2	4
2 6½	3¾	2 8	4½
2 11½	4¼	3 0	5¼
3 4½	4¾	3 6	6
3 9½	5¼	3 11	6½
4 2½	5¾	4 4	7¼
4 7½	6¼	4 9	7¾
5 0½	6¾	5 2½	8½
5 5½	7¼	5 7	9
5 10½	7¾	6 0½	9½
6 3½	8¼	6 5½	10¼
6 8½	8¾	6 10½	11
7 1½	9¼	7 4	11½
7 6½	9¾	7 9	12¼
7 11½	10¼	8 2	12¾
8 4½	10¾	8 7	13½
8 9½	11¼	9 0	14
9 2½	11¾	9 5½	14¾
9 7½	12¼	9 10½	15¼
10 0½	12¾	10 3½	15¾
10 5½	13¼	10 9	16½
10 10½	13¾	11 2	17¼
11 3½	14¼	11 7	18

See Advt., pp. 2, 20, 27.

The above calculations do not apply to Lift Cages, the spacing for which are about 4in.

If made to hinge aside, add 2¼in. and 2½in. extra if with lifting bottom track.

WROUGHT STEEL.

The use of Steel for ordinary constructional purposes aided by improved machinery has completely displaced wrought iron, at about the same cost, and as it possesses much greater tensile strength than this, it is obviously more economical to use it.

ROOFS.

Labor at 2/9 per hour.

Roofs with trussed principals and purlins of ordinary spans, framed of tees, angles, flat bars, &c., including all holes, bolts, base plates, connections, &c., complete, and including erection 35/- per cwt. upwards.

Rolled Steel Joists, cut to lengths, from 20/- per cwt. upwards.

Rolled Steel Joists, Framed Reinforcement, for buildings—

Girders, from 14s. 3d. per cwt. Stanchions from 17s. per cwt. Labor on above and profit—8/- to 16/-

WROUGHT IRON.

Per cwt., Current Prices.

	s. d.		s. d.
Wrought bar, round or half-round iron... ...	11 0	to	13 0
Sheet Iron, 10 to 28 gauge	14 0	to	18 0
Angle T and channel iron			20 0

N.B.—For large "Lines," *see* Weekly List.

WROUGHT IRON. Fixed, per lb.	From s. d.	To s. d.
Wharves and Bridges.—Wt. iron in straps, shoes, rings and straps of piles, anchor and other bolts and dumps for planking wharves ...	0 6	0 9
Bolts.—From 15in. to 36in. long, including tie-bolts for king posts	0 6	0 9
Wrought iron cell doors for gaols, including hinges, straps, staples and fastenings, fixed complete, about £10 each or	1 0	1 6
Plain square balusters for stairs, &c., per lb. ...	0 6	0 9
Iron hand rail and square balusters, including fixing and lead	1 0	1 6
Iron roofs complete, including angle, T. and rod iron for rafters, struts, king and queen posts, tie-rods, &c.	0 6	0 8
Gates and Girders—		
Framed gates, with hinges fixed, per lb... ...	0 9	1 0
Wrought iron plate and box girders, colonial	£25 to £28 per ton	

WROUGHT IRON.

Labor.

Hanging a pair of iron gates with portable or other crane, gates about 3 tons, 8 men, 10 hours, at 3s. per hour	£10	to £12
Hanging single or side-gates, with above, everything prepared, for drilling and leading into stone piers, hanging and lock stiles, 2 men, 9 hours each	£3	to £5
Guard bars, with strap ends, unframed, for windows	s. d.	s. d.
of stores, gaols, &c., per lb.	0 8	to 0 10
Strong brackets, framed with braces	1 0	1 4
Iron work for pumps	1 2	1 6
Plate Iron Tanks	0 6	0 7
Chimney and Arch Bars	0 6	0 7
Ties and straps in floors and roofs	0 8	0 10

See advt., inside cover, and 37, for quotations.

WEIGHT OF 100 IRON PAN-HEADED RIVETS IN LBS.

Length under head to point.
Diameter of Rivets in inches.

	5-16	6-16	7-16	8-16	9-16	10-16	12-16	14-16	1in.
ins.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
½	2.06	3.26	4.83	6.82	9.28	12.25	19.94	30. 8	43.63
9/16	2.33	3.64	5.35	7.50	10.14	13.32	21.48	32.36	46.36
5/8	2.60	4.03	5.87	8.18	11.00	14.38	23.01	34.45	49.09
7/8	2.86	4.41	6.39	8.86	11.86	15.45	24.54	36.54	51.81
1	3.13	4.79	6.92	9.54	12.73	16.51	26.08	38.63	54.54
1¼	3.66	5.56	7.96	10.91	14.45	18.64	29.15	42.80	60.00
1½	4.19	6.33	9.00	12.27	16.18	20.77	32.21	46.98	65.45
1¾	4.73	7.09	10.05	13.64	17.91	22.90	35.28	51.16	70.90
2	5.26	7.86	11.09	14.99	19.63	25.03	38.35	55.33	76.36
2¼	5.79	8.63	12.14	16.36	21.36	27.17	41.42	59.51	81.81
2½	6.32	9.40	13.18	17.73	23.08	29.30	44.49	63.68	87.27
2¾	6.86	10.17	14.22	19.09	24.81	31.43	47.55	67.86	92.72
3	7.39	10.93	15.27	20.45	26.53	33.56	50.62	72.04	98.18
3¼	7.92	11.70	16.31	21.82	28.26	35.69	53.69	76.21	103.63
3½	8.45	12.46	17.36	23.18	29.99	37.82	56.76	80.39	109.08
3¾	8.99	13.23	18.40	24.54	31.71	39.95	59.8	84.56	114.54
4	9.52	14.00	19.44	25.91	33.44	42.08	62.89	88.74	119.99

Useful Cements.

Rust for Iron.—Wrought iron filings, 65 parts ; sal-ammoniac, 2½ ; sulphur (flowers), 1½ ; sulphuric acid. 1. Mix dry, sulphuric acid with sufficient water then added.

Iron Pipes.—Wrought-iron filings, 45 parts ; clay, 20 ; china clay, 15 ; common salt solution, 8. If china clay cannot be found, fireclay will do.

WEIGHT OF STEEL JOISTS, AND SAFE CARRYING LOAD.

Standard Sections, British.

A — Depth of Joist. C — Thickness of web.
B — Width of Flange. D — Thickness of Flange.

Dimensions in Inches and diameter				Weight per foot run	Safe Load in Tons Distributed for Clear Spans of						
A	B	C	D	lbs.	6ft.	8ft.	10ft.	12ft.	16ft.	20ft.	30ft.
3	1½	.16	.248	4.0	0.92	—	0.55	0.46	—	—	—
3	3	.20	.332	8.5	2.0	—	1.2	1.0	—	—	—
4	1¾	.17	.24	5.0	1.5		0.91	0.76	—	—	—
4	3	.22	.336	9.5	3.1	2.5	1.9	1.6	—	—	—
4¾	1¾	.18	.325	6.5	2.4	—	1.4	1.2	—	—	—
5	3	.22	.376	11.0	4.5	3.6	2.7	2.3	1.7	—	—
5	4½	.29	.448	18.0	7.6	—	4.5	3.8	2.8	—	—
6	3	.26	.348	12.0	5.6	4.5	3.4	2.8	2.1	—	—
6	4½	.37	.431	20.0	9.6	—	5.8	4.8	3.6	—	—
6	5	.41	.520	25.0	12.0	—	7.3	6.0	4.5	—	—
7	4	.25	.387	16.0	9.4	—	5.6	4.7	3.5	2.8	—
8	4	.28	.402	18.0	11.0	—	7.0	5.8	4.3	3.5	—
8	5	.35	.575	28.0	18.0	—	11.0	9.0	7.0	5.5	—
8	6	.44	.597	35.0	23.0	—	14.0	11.0	8.6	7.0	—
9	4	.30	.460	21.0	15.0	—	9.0	7.5	5.6	4.5	—
9	7	.55	.924	58.0	42.0	—	25.0	21.0	16.0	12.0	—
10	5	.36	.552	30.0	24.0	—	14.0	12.0	9.0	7.2	—
10	6	.40	.736	42.0	35.0	—	21.0	17.0	13.0	10.0	—
10	8	.60	.970	70.0	53.0	—	34.0	28.0	21.0	17.0	—
12	5	.35	.550	32.0	30.0	—	18.0	15.0	11.0	9.0	—
12	6	.40	.717	44.0	40.0	—	26.0	22.0	16.0	13.0	—
12	6	.50	.883	54.0	52.0	—	31.0	26.0	19.0	15.0	10.0
14	6	.40	.698	46.0	43.0	—	31.0	26.0	19.0	15.0	10.0
14	6	.50	.873	57.0	59.0	—	38.0	31.0	24.0	19.0	12.0
15	5	.42	.647	42.0	47.0	—	28.0	24.0	18.0	14.0	9.5
15	6	.50	.880	59.0	62.0	—	42.0	35.0	26.0	21.0	14.0
16	6	.55	.847	62.0	73.0	—	45.0	38.0	28.0	22.0	15.0
18	7	.55	.928	75.0	—	—	64.0	53.0	40.0	32.0	21.0
20	7½	.60	1.01	89.0	—	—	83.0	69.0	52.0	41.0	27.0
24	7½	.60	1.07	100.0	—	—	102.0	92.0	69.0	55.0	36.0

Span should not exceed 20 times the depth of single joist.

Example for reading above table :—10 x 8 joist, with thickness web .60 inch, flange .97, weighs 70 lb. per foot run. Safe distributed load for 10 feet span is 34 tons ; for 16 feet span, 21 tons. Calculated at quarter the breaking strain.

I ROLLED STEEL BEAMS AS STANCHIONS.

(Dorman, Long & Co.)

Safe Loads in tons for Lengths in feet.

Size. Inches.	Weight. per ft. lbs.	Feet long. 6	8	10	12	14	16	18	20	22	24
24 x 7½	... 100	164	154	143	130	115	100	87	76	—	—
20 x 7½	... 89	146	138	129	118	105	92	80	70	—	—
10 x 8	... 70	118	113	108	101	94	86	78	70	62	56
18 x 7	... 75	122	115	106	96	84	73	63	—	—	—
9 x 7	... 58	96	92	86	79	72	64	56	50	—	—
16 x 6	... 62	98	89	79	67	57	48	—	—	—	—
15 x 6	... 59	94	86	77	67	57	48	—	—	—	—
14 x 6	... 57	91	84	76	66	56	48	—	—	—	—
12 x 6	... 54	87	80	73	64	55	47	—	—	—	—
14 x 6	... 46	73	67	60	52	44	37	—	—	—	—
12 x 6	... 44	70	65	59	51	44	38	—	—	—	—
10 x 6	... 42	68	63	57	51	44	38	32	—	—	—
8 x 6	... 35	56	52	47	41	35	30	—	—	—	—
15 x 5	... 42	62	54	44	36	—	—	—	—	—	—
12 x 5	... 39	59	52	43	35	—	—	—	—	—	—
10 x 5	... 35	53	47	40	33	27	—	—	—	—	—
12 x 5	... 32	48	42	35	28	—	—	—	—	—	—
10 x 5	... 30	45	40	34	28	23	—	—	—	—	—
8 x 5	... 28	43	39	33	28	23	—	—	—	—	—
6 x 5	... 25	38	34	30	25	20	—	—	—	—	—
6 x 4½	... 20	29	25	21	17	—	—	—	—	—	—
5 x 4½	... 18	27	24	20	16	—	—	—	—	—	—
9 x 4	... 21	29	23	18	—	—	—	—	—	—	—
8 x 4	... 18	25	20	15	—	—	—	—	—	—	—
7 x 4	... 16	22	18	14	—	—	—	—	—	—	—

Weight of Steel Girder Plates, per ft. run.

Thickness	¼in.	5/16in.	⅜in.	½in.	⅝in.	¾in.	⅞in.
Width.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
8 inches ...	7	8⅞	10⅔	14	17¾	21	24¾
9 ,, ...	8	9¾	12	16	19¼	24	27¼
10 ,, ...	8¾	11	13½	17½	22	27	30¾
12 ,, ...	10½	13¼	16	20¾	25½	32	36¾
14 ,, ...	12¼	15¼	18	24½	30	36	42¼
15 ,, ...	13	16½	20	26	33	40	46
16 ,, ...	14	17¾	21⅓	28	35½	42	49½
18 ,, ...	16	19⅞	24	31	38½	48	54½
20 ,, ...	17½	22	27	35	44	54	61⅓
24 ,, ...	21	26½	32	41½	51	64	72

SPIKES.

Weight of 1000 Iron Spikes of different lengths.

	lbs.		lbs.
5in. long	190	8in. long	525
6in. long	262	9in. long	626
7in. long	375	10in. long	900

NAILS.

Number of Diamond Head Nails in a 7lbs. packet.
Different lengths and gauges.

In. Gauge.	Approx. Number.	In. Guage.	Approx. Number.
1 x 16	7400	$2\frac{1}{2}$ x 11	910
1 x 15	5600	$2\frac{1}{2}$ x 10	700
1 x 14	5000	$2\frac{1}{2}$ x 9	560
$1\frac{1}{3}$ x 14	2300	$2\frac{1}{2}$ x 8	455
$1\frac{1}{2}$ x 12	1680	3 x 10	567
$1\frac{1}{2}$ x 11	1440	3 x 9	469
$1\frac{3}{4}$ x 11	1225	3 x 8	420
2 x 14	1860	3 x 7	336
2 x 13	1710	3 x 6	273
2 x 12	1330	$3\frac{1}{2}$ x 8	308
2 x 11	1064	$3\frac{1}{2}$ x 7	280
2 x 10	840	4 x 7	245
2 x 9	700	4 x 6	210
$2\frac{1}{2}$ x 13	1400	5 x 5	147
$2\frac{1}{2}$ x 12	1050	6 x 4	91

HOOP IRON.

$\frac{1}{2}$-cwt. bundle contains.

Wdth. Gge.	feet.	Wdth. Gge.	feet.
$\frac{1}{3}$ x 22	1075	$1\frac{1}{2}$ x 16	155
$\frac{1}{2}$ x 24	1350	$1\frac{1}{2}$ x 18	225
$\frac{3}{4}$ x 20	570	$1\frac{3}{4}$ x 14	130
$\frac{7}{8}$ x 19	425	$1\frac{3}{4}$ x 17	173
1 x 11	340	2 x 14	107
1 x 20	426	2 x 16	124
$1\frac{1}{8}$ x 17	270	$2\frac{1}{4}$ x 13	90
$1\frac{1}{8}$ x 18	300	$2\frac{1}{2}$ x 12	73
$1\frac{1}{4}$ x 16	210	$2\frac{1}{2}$ x 16	107
$1\frac{1}{4}$ x 18	268	3 x 12	59

BIRMINGHAM WIRE GAUGE.

Comparative Sizes.

No.	1	4	7	11	16	22	
	5–16	$\frac{1}{4}$	3–16	$\frac{1}{8}$	1–16	1–32	gauges — of an inch.

TABLE exhibiting the weight of a lineal foot of square and round Bar Iron.

Side and diam. in inches	Square in lbs.	Round in lbs.	Side and diam. in inches	Square in lbs.	Round in lbs.	Side and diam. in inches	Square in lbs.	Round in lbs.
$\frac{1}{4}$	.21	.16	$1\frac{1}{2}$	7.52	5.91	$3\frac{1}{2}$	40.92	32.17
$\frac{5}{16}$	.33	.26	$1\frac{5}{8}$	8.83	6.93	$3\frac{5}{8}$	43.89	34.47
$\frac{3}{8}$	.47	.37	$1\frac{3}{4}$	10.23	8.04	$3\frac{3}{4}$	46.97	36.90
$\frac{7}{16}$	.64	.50	$1\frac{7}{8}$	11.74	9.22	$3\frac{7}{8}$	50.15	39.39
$\frac{1}{2}$	.84	.66	2	13.36	10.50	4	53.44	41.98
$\frac{9}{16}$	1.06	.83	$2\frac{1}{8}$	15.08	11.85	$4\frac{1}{8}$	56.83	44.64
$\frac{5}{8}$	1.31	1.03	$2\frac{1}{4}$	16.91	13.28	$4\frac{1}{4}$	60.33	47.39
$\frac{11}{16}$	1.58	1.24	$2\frac{3}{8}$	18.84	14.80	$4\frac{3}{8}$	63.93	50.21
$\frac{3}{4}$	1.88	1.48	$2\frac{1}{2}$	20.88	16.40	$4\frac{1}{2}$	67.64	53.13
$\frac{13}{16}$	2.21	1.73	$2\frac{5}{8}$	23.12	18.15	$4\frac{5}{8}$	71.45	56.11
$\frac{7}{8}$	2.56	2.01	$2\frac{3}{4}$	25.26	19.84	$4\frac{3}{4}$	75.36	59.19
$\frac{15}{16}$	2.94	2.31	$2\frac{7}{8}$	27.61	21.68	5	83.51	65.59
1	3.34	2.62	3	30.07	23.65	$5\frac{1}{4}$	92.46	72.62
$1\frac{1}{8}$	4.23	3.32	$3\frac{1}{8}$	32.62	25.62	$5\frac{1}{2}$	101.04	79.37
$1\frac{1}{4}$	5.22	4.10	$3\frac{1}{4}$	35.28	27.71	$5\frac{3}{4}$	110.43	86.73
$1\frac{3}{8}$	6.32	4.96	$3\frac{3}{8}$	38.05	29.88	6	120.24	94.61

WEIGHT OF BOLT HEADS AND NUTS IN LBS.

Diam. of Bolts in ins.	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	3
Weight of Hex. nut and head	.017	.057	.128	.267	.43	.73	1.10	2.14	3.78	5.6	8.75	17.	288.
Do. Square nut and head	.021	.069	.164	.32	.55	.88	1.31	2.56	4.42	7.2	10.5	21.	36.4

LYSAGHT'S IRON TABLE.

Weight of Round and Square Iron and Steel.

Size (dia.)	IRON.		STEEL.	
	Round Weight per lineal foot	Square Weight per lineal foot	Round Weight per lineal foot	Square Weight per lineal foot
3/16	0.092	0.117	0.094	0.120
1/4	0.164	0.218	0.157	0.213
5/16	0.256	0.326	0.261	0.332
3/8	0.368	0.469	0.376	0.478
7/16	0.501	0.638	0.511	0.651
1/2	0.654	0.833	0.668	0.849
9/16	0.828	1.062	0.845	1.067
5/8	1.023	1.302	1.043	1.328
11/16	1.237	1.576	1.262	1.607
3/4	1.473	1.875	1.502	1.912
13/16	1.728	2.201	1.763	2.245
7/8	2.004	2.552	2.044	2.603
15/16	2.301	2.930	2.347	2.988
1	2.618	3.333	2.670	3.400
1 1/8	3.313	4.219	3.380	4.303
1 1/4	4.091	5.208	4.172	5.312
1 3/8	4.950	6.302	5.049	6.428
1 1/2	5.890	7.500	6.008	7.750
1 5/8	6.913	8.802	7.051	8.978
1 3/4	8.018	10.208	8.178	10.412
1 7/8	9.204	11.719	9.388	11.953
2	10.472	13.333	10.681	13.600
2 1/8	11.82	15.05	12.06	15.35
2 1/4	13.25	16.87	13.52	17.21
2 3/8	14.77	18.80	15.06	19.18
2 1/2	16.36	20.83	16.69	21.25
2 5/8	18.04	22.97	18.40	23.43
2 3/4	19.80	25.21	20.19	25.71
2 7/8	21.64	27.55	22.07	28.10
3	23.56	30.00	24.03	30.60
3 1/4	27.65	35.21	28.21	35.91
3 1/2	32.07	40.83	32.71	41.65
3 3/4	36.82	46.87	37.55	47.81
4	41.89	53.33	42.73	54.40
4 1/4	47.29	60.21	48.23	61.41
4 1/2	53.01	67.50	54.07	68.85
4 3/4	59.07	75.21	60.25	76.71
5	65.45	83.33	66.76	85.00
5 1/2	79.19	100.83	80.78	102.85
6	94.25	120.00	96.13	122.40

WEIGHT OF 100 BOLTS AND NUTS.

In Lbs. and Decimals.

Length of Bolt in inches.

Heads & Nuts	2	2½	3	3½	4	4½	5	5½	6	6½	7
¼″ dia. Hexagon	4.36	5.	5.7	6.3	7.	7.7	8.36	9.	9.7	10.3	11.
¼″ dia. Square	4.7	5.4	6.1	6.7	7.4	8.1	8.7	9.4	10.1	10.7	11.4
⅜″ dia. Hexagon	11.8	13.4	14.9	16.4	18.	19.6	21.1	22.6	24.2	25.7	27.2
⅜″ dia. Square	13.	14.6	16.1	17.6	19.2	20.8	22.3	23.8	25.4	26.9	28.4
½″ dia. Hexagon	23.8	26.5	29.3	32.	34.7	37.6	40.2	43.	45.8	48.5	51.2
½″ dia. Square	27.4	30.1	32.9	35.6	38.3	41.2	43.8	46.6	49.8	52.1	54.8
⅝″ dia. Hexagon	43.8	48.1	52.4	56.7	61.	65.4	69.6	73.9	78.2	82.4	86.7
⅝″ dia. Square	49.1	53.4	57.7	62.	66.3	70.7	74.9	79.2	83.5	87.7	92.
¾″ dia. Hexagon	67.6	73.	80.	86.1	92.3	98.	104.	111.	117.	123.	129.
¾″ dia. Square	79.6	85.	92.	98.1	104.	110.	116.	122.	129.	135.	141.
⅞″ dia. Hexagon	106.	114.	123.	131.	140.	148.	156.	165.	173.	182.	194.
⅞″ dia. Square	121.	129.	138.	146.	155.	163.	171.	180.	188.	197.	205.
1″ dia. Hexagon	153.	164.	175.	185.	196.	208.	218.	229.	240.	251.	262.
1″ dia.	174.	185.	196.	206.	217.	229.	239.	250.	261.	272.	283.

WEIGHT OF 100 BOLTS AND NUTS (Continued).

In Lbs. and Decimals.

Length of Bolt in Inches.

	8	9	10	11	12	13	14	15	16	17	18
¼″ dia. Hexagon	12.3	13.7	15.	16.3	17.7	19.	20.3	21.7	23.	24.3	25.7
¼″ dia. Square	12.7	14.1	15.4	16.7	18.1	19.4	20.7	22.1	24.4	24.7	26.1
⅜″ dia. Hexagon	30.3	33.4	36.5	39.5	42.7	45.7	48.9	51.9	55.	58.1	81.2
⅜″ dia. Square	31.5	34.6	37.7	40.7	43.9	46.9	50.	53.1	56.2	59.3	82.4
½″ dia. Hexagon	56.7	62.3	67.7	73.1	78.8	84.1	89.7	95.3	100.	106.	111.
½″ dia. Square	60.3	65.9	71.3	76.7	82.4	87.7	93.3	99.	104.	110.	115.
⅝″ dia. Hexagon	95.3	104.	112.	121.	129.	138.	146.	155.	164.	172.	183.
⅝″ dia. Square	100.	109.	117.	126.	135.	143.	152.	161.	169.	178.	188.
¾″ dia. Hexagon	141.	154.	166.	178.	191.	203.	215.	228.	240.	252.	265.
¾″ dia. Square	153.	166.	178.	190.	203.	215.	227.	230.	252.	264.	277.
⅞″ dia. Hexagon	211.	227.	240.	257.	278.	291.	307.	324.	340.	358.	379.
⅞″ dia. Square	222.	238.	255.	272.	289.	306.	322.	339.	355.	373.	394.
1″ dia. Hexagon	283.	305.	326.	348.	370.	391.	413.	435.	456.	478.	500.
1″ dia. Square	304.	326.	357.	369.	391.	412.	434.	456.	477.	499.	521.

For over 18 inches long, add for every inch, per gross (or 144 bolts), as under :—

Bolts, inches diam.	⅜	½	⅝	¾	⅞	1
Lbs.	5	8	12	18	24	32

ANGLE AND TEE IRON.

Weight per foot run.

Size.	Thickness.	Weight lbs.	Size.	Thickness.	Weight lbs.
$\frac{3}{4} \times \frac{3}{4}$	$\frac{3}{16}$	0.86	$2\frac{1}{2} \times 2\frac{1}{2}$	$\frac{5}{16}$	4.93
1×1	$\frac{3}{16}$	1.16	$2\frac{1}{2} \times 2\frac{1}{2}$	$\frac{3}{8}$	5.88
1×1	$\frac{1}{4}$	1.56	$2\frac{1}{2} \times 2\frac{1}{2}$	$\frac{7}{16}$	6.82
$1\frac{1}{4} \times 1\frac{1}{4}$	$\frac{1}{4}$	1.95	$2\frac{1}{2} \times 2\frac{1}{2}$	$\frac{1}{2}$	7.75
$1\frac{1}{4} \times 1\frac{1}{4}$	$\frac{5}{16}$	2.38	3×3	$\frac{5}{16}$	5.95
$1\frac{1}{2} \times 1\frac{1}{2}$	$\frac{3}{8}$	2.36	3×3	$\frac{3}{8}$	7.11
$1\frac{1}{2} \times 1\frac{1}{2}$	$\frac{5}{16}$	2.91	3×3	$\frac{7}{16}$	8.25
$1\frac{1}{2} \times 1\frac{1}{2}$	$\frac{3}{8}$	3.46	3×3	$\frac{1}{2}$	9.44
$1\frac{3}{4} \times 1\frac{3}{4}$	$\frac{5}{16}$	3.40	$3\frac{1}{2} \times 3\frac{1}{2}$	$\frac{5}{16}$	7.05
$1\frac{3}{4} \times 1\frac{3}{4}$	$\frac{3}{8}$	4.04	$3\frac{1}{2} \times 3\frac{1}{2}$	$\frac{3}{8}$	8.34
2×2	$\frac{1}{4}$	3.16	$3\frac{1}{2} \times 3\frac{1}{2}$	$\frac{7}{16}$	9.70
2×2	$\frac{5}{16}$	3.91	$3\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{2}$	11.04
2×2	$\frac{3}{8}$	4.66	$3\frac{1}{2} \times 3\frac{1}{2}$	$\frac{9}{16}$	12.34
2×2	$\frac{7}{16}$	5.39	4×4	$\frac{5}{16}$	8.67
2×2	$\frac{1}{2}$	6.04	4×4	$\frac{3}{8}$	9.65
$2\frac{1}{4} \times 2\frac{1}{4}$	$\frac{5}{16}$	4.42	4×4	$\frac{7}{16}$	11.16
$2\frac{1}{4} \times 2\frac{1}{4}$	$\frac{3}{8}$	5.27	4×4	$\frac{1}{2}$	12.70
$2\frac{1}{4} \times 2\frac{1}{4}$	$\frac{7}{16}$	6.10	4×4	$\frac{9}{16}$	14.17
$2\frac{1}{4} \times 2\frac{1}{4}$	$\frac{1}{2}$	6.93	5×5	$\frac{1}{2}$	15.50

WEIGHTS OF FLAT BAR STEEL.

In lbs. per Lineal Foot.

Breadth in inches.	Thickness in fractions of an inch.								
	4–16	5–16	6–16	7–16	8–16	10–16	12–16	14–16	1 in.
1	.85	1.06	1.28	1.49	1.70	2.13	2.55	2.98	3.40
$1\frac{1}{8}$	.96	1.20	1.43	1.67	1.91	2.39	2.87	3.35	3.83
$1\frac{1}{4}$	1.06	1.33	1.59	1.86	2.13	2.66	3.19	3.72	4.25
$1\frac{3}{8}$	1.17	1.46	1.75	2.05	2.34	2.92	3.51	4.09	4.68
$1\frac{1}{2}$	1.28	1.59	1.91	2.23	2.55	3.19	3.83	4.46	5.10
$1\frac{3}{4}$	1.49	1.86	2.23	2.60	2.98	3.72	4.46	5.21	5.95
2	1.70	2.13	2.55	2.98	3.40	4.25	5.10	5.95	6.80
$2\frac{1}{4}$	1.91	2.39	2.87	3.35	3.83	4.78	5.74	6.69	7.65
$2\frac{1}{2}$	2.13	2.66	3.19	3.72	4.25	5.31	6.38	7.44	8.50
$2\frac{3}{4}$	2.34	2.92	3.51	4.09	4.68	5.84	7.01	8.18	9.35
3	2.55	3.19	3.83	4.46	5.10	6.38	7.65	8.93	10.20
$3\frac{1}{4}$	2.76	3.45	4.14	4.83	5.53	6.91	8.29	9.67	11.05
$3\frac{1}{2}$	2.98	3.72	4.46	5.21	5.95	7.44	8.93	10.41	11.90
4	3.40	4.25	5.10	5.95	6.80	8.50	10.20	11.90	13.60
$4\frac{1}{2}$	3.83	4.78	5.74	6.69	7.65	9.56	11.48	13.39	15.30
5	4.25	4.31	6.38	7.44	8.50	10.63	12.75	14.88	17.00
6	5.10	6.38	7.65	8.93	10.20	12.75	15.30	17.85	20.40

Wrought Iron Box Girders.

Table for wrought iron girders according to spans.

Spans.	Height of 18 inch walls supported.	Constant load of walls, floors and roofing.	Sectional area of bottom of girder.	Sectional area of top of girder.	Depth of girder.	Thickness of vertical plates.	Angle irons.
10 ft.	10 ft.	13 ton	5 in.	6 in.	9 in.	3-16 in.	3x3x$\frac{1}{2}$ in.
do.	15 „	18 „	6 „	7 „	do.	do.	3x3x$\frac{1}{2}$ in.
do.	20 „	24 „	8$\frac{1}{2}$ „	10 „	do.	do.	3x3x$\frac{1}{2}$ in.
15 ft.	10 „	20 „	8 „	9 „	12 in.	$\frac{1}{4}$ in.	3$\frac{1}{2}$x3$\frac{1}{2}$x$\frac{7}{16}$ in.
do.	15 „	26 „	10 „	12 „	do.	do.	3$\frac{1}{2}$x3$\frac{1}{2}$x$\frac{7}{16}$ in.
do.	20 „	35 „	13$\frac{1}{2}$ „	15 „	do.	do.	3$\frac{1}{2}$x3$\frac{1}{2}$x$\frac{7}{16}$ in.
20 ft.	10 „	5 „	9$\frac{1}{2}$ „	11 „	16 in.	5-16 in.	3$\frac{1}{2}$x2$\frac{1}{2}$x$\frac{5}{16}$ in.
do.	15 „	35 „	13$\frac{1}{2}$ „	15 „	do.	do.	3$\frac{1}{2}$x2$\frac{1}{2}$x$\frac{5}{16}$ in.
do.	20 „	46 „	18 „	21 „	do.	do.	3$\frac{1}{2}$x2$\frac{1}{2}$x$\frac{5}{16}$ in.

These beams are calculated to break with about four times the loads, in tons, here mentioned.

Wrought iron plate girders, of the same strength as the box girders, given above, may be made by increasing the area of the top and bottom plates $\frac{1}{2}$ inch, the thickness of the vertical plates for the 10 feet girders $\frac{1}{8}$ inch, and the 15 and 20 feet girders, 3-16ths inch.

CIRCULAR IRON SPIRAL STAIRCASE.

5ft. diam., fixed per foot in height from floor to floor ... £5 10 0
4ft. 6in. diam., do. do. do. £5 0 0

The expansion of Cast Iron, 100ft. in length, by an increase of 100 degrees of heat (Fahrenheit) — about $\frac{3}{4}$ of an inch.

The expansion of Bar Iron — about 9-10ths. of an inch.

Exclusive of Patterns and Fixing, per cwt.

	£ s. d.		£ s. d.
Hollow columns, with caps and bases ...	1 4 0	to	1 16 0
Water or gas pipes with flange or faucet ends, in small quantities, 3in., 4in., and 5in. dia...	1 4 0	to	1 10 0
Furnace bars, sewer gates, and area gratings ...	1 8 0	to	1 12 0
Furnace doors and frames, complete	1 16 0	to	2 4 0
Cast-iron plates for floors, $\frac{3}{16}$in. to $\frac{5}{16}$in. ...	1 4 0	to	1 12 0
Roof or Bridge castings, viz., heads, shoes, couplings, &c.	2 0 0	to	2 10 0

Window Guards, from 18 to 30 high, from 10/– to 14/– per foot run.

Shrinkage of Casting in a foot. Pipes, $\frac{1}{8}$in. Zinc and lead per foot $\frac{5}{16}$in.; Copper, per foot, $\frac{3}{16}$in.; Tin, $\frac{1}{4}$in.

Girders and Beams $\frac{1}{8}$in. in 15in.; Brass, $\frac{1}{8}$in. in 10in.

CAST IRON.

CASTINGS FROM STOCK PATTERNS.

	£	s.	d.
Columns, with cap and base, 10ft. x 4½in., each	4	0	0

Balcony Railing—

Cast iron, 2ft. 9in. high, 14lb. to 16lb., per foot run, from 3/9 to 0 6 6

Wrought top rail, 1/6 per ft. ; Stays, 5/– ; 3ft. Gates, 30/– each.

Cast iron ornamental brackets, 16in. x 20in., 5/– to 7/6.

Panelling Frieze—

Cast iron frieze, 6in., 1/6 ; 9in., 2/– ; 11in., 2/6 : 15in., 3/– foot run.

Manufacturers' *advt.*, p. 3.

BAKER'S OVEN FITTINGS.

Measurements and Weights.

	Length. ft.	in.	Height. ft.	in.	Weight. cwt.	qrs.	lb.
Peel Plate and Frame, overall ...	5	7	2	9	5	0	15
Oven Door, inside	1	11½	1	3½			
Furnace Door and Frame, outside	1	10	1	7¾	1	2	0
Furnace Door, inside	1	1½	1	0½			
Ash Pit Frame, outside	1	10	2	1			
Ash Pit Door, inside	1	1¾	1	8			
2 Bearing Bars and 12 Furnace Bars	2	6	—		2	0	4
1 Steam Damper, inside measurement, 9in. x 11¾in.					0	0	26
					8	3	17

	£	s.	d.
No. 1 Set—Complete Set, as above	25	0	0
No. 2 Set—Complete Set, as above, but with the length of the Peel Plate 6in. shorter	24	0	0

Tie Rods and Plates size to order extra.

	Weight. cwt.	qrs.	lbs.
Oven door, 18½in. wide x 12in. high, and Frame, 24¾in. wide, 15¾in. high	–	2	10
Peel Plate, 46in. at front, tapering to 25in. at back x 18in. deep...	–	2	18
8 Furnace—8 Bars, 2ft. 6in. long, and 2 Bearers	1	2	10
2 Dampers and Frames, 10in. x 12in., with 4 W. Iron Rods, 18in. long x ⅝in., with nuts	–	1	0
Furnace and Ash Pit Frame overall, 18in. wide x 45in. high	1	0	11
	4	0	21

Furnace Opening, inside, 12in. x 12in. Ash Pit Opening, inside, 12in. x 23½in. high.

	£	s.	d.
No. 3 Set, as above, price from	10	0	0
Bakers' Oven Pyrometers, each	9	0	0
„ Oven Lights	14	0	0

For further information, *see advt.*, *p.* 2.

The Weight per Foot Super of Cast or Wrought Iron.

Thickness	Cast Iron.	Wrought Iron.	Thickness.	Cast Iron.	Wrought Iron.
Inch	lbs.	lbs.	Inch.	lbs.	lbs.
1-16	2.35	2.52	$\frac{5}{8}$	23.44	25.20
$\frac{1}{8}$	4.09	5.04	$\frac{3}{4}$	28.12	30.24
$\frac{1}{4}$	9.39	10.08	$\frac{7}{8}$	32.81	35.28
$\frac{3}{8}$	14.06	15.12	1	37.50	40.32
$\frac{1}{2}$	18.75	20.16			

Table showing the Approximate Weight that Given Diameter and Thickness of Metal in Hollow Cast Iron Columns will support.

The following dimensions are calculated for 10 feet columns, but may be safely adopted up to 12 feet long.

Outside diameter of column inches.	Thickness of metal inches.	Weight supported tons cwts.	Outside diameter of column inches.	Thickness of metal inches.	Weight supported tons cwts.
3	$\frac{1}{2}$	3 0	8	$\frac{3}{4}$	18 10
	$\frac{3}{4}$	4 10		1	23 15
	1	6 0		$1\frac{1}{4}$	27 10
$3\frac{1}{2}$	$\frac{1}{2}$	3 15	9	$\frac{3}{4}$	22 10
	$\frac{3}{4}$	6 0		1	26 10
	1	7 15		$1\frac{1}{4}$	35 0
4	$\frac{1}{2}$	4 5	10	1	27 10
	$\frac{3}{4}$	7 0		$1\frac{1}{2}$	51 0
	1	9 10	11	1	32 10
$4\frac{1}{2}$	$\frac{1}{2}$	6 0		$1\frac{1}{2}$	55 0
	$\frac{3}{4}$	8 15	12	1	38 0
	1	11 5		$1\frac{1}{2}$	62 10
5	$\frac{1}{2}$	6 10	13	1	47 10
	$\frac{3}{4}$	9 15		$1\frac{1}{2}$	70 0
	1	13 0	14	1	52 10
$5\frac{1}{2}$	$\frac{1}{2}$	7 0		$1\frac{1}{2}$	78 0
	$\frac{3}{4}$	11 5	15	1	56 10
	1	15 10		$1\frac{1}{2}$	85 0
6	$\frac{1}{2}$	8 10	16	1	61 0
	$\frac{3}{4}$	13 0		$1\frac{1}{2}$	90 0
	1	17 10	17	1	65 10
$6\frac{1}{2}$	$\frac{1}{2}$	9 10		$1\frac{1}{2}$	95 0
	$\frac{3}{4}$	14 15	18	1	72 0
	1	20 0		$1\frac{1}{2}$	100 0
7	$\frac{1}{2}$	10 5			
	$\frac{3}{4}$	16 0			
	1	21 10			

Weight of Cast Iron Pipes.

Note.—The inch pipes are 3½ feet long, the 1½ inch 4½ feet long, the 2 and 2½ inch are 6 feet long, and the other sizes 9 feet long.

Bore.	Thick.	Weight.	Bore.	Thick.	Weight.	Bore.	Thick.	Weight.
In.	In.	cwt. qrs. lbs.	In.	In.	cwt. qrs. lbs	In.	In.	cwt. qrs. lbs.
1	¼	0 0 12	5½	½	2 2 0	12	¾	7 3 20
	⅜	0 0 21		⅝	3 0 18		1	10 3 0
1½	¼	0 0 21		¾	3 3 7	13	¾	8 2 7
	⅜	0 1 4	6	½	2 2 21		1	11 2 12
2	¼	0 1 8		⅝	3 1 17	14	⅝	7 2 16
	⅜	0 2 0		¾	4 0 16		¾	9 1 0
2½	⅜	0 2 10		1	5 2 20		1	12 1 14
	½	0 3 10	7	½	3 0 7	15	⅝	9 3 7
3	⅜	1 0 6		⅝	3 3 20		1	13 0 26
	½	1 1 12		¾	4 3 5		1¼	10 3 5
	⅝	1 3 6		1	6 2 4	16	¾	10 1 20
3½	⅜	1 0 21	8	⅝	4 1 25		1	14 0 8
	½	1 2 14		¾	5 1 18		1¼	17 3 14
	⅝	2 0 8		1	7 1 16	18	1	15 2 24
4	½	1 3 12	9	⅝	5 0 4		1⅛	17 2 26
	⅝	2 1 12		¾	6 0 2		1¼	20 0 2
	¾	2 3 21		1	8 0 26	20	1	17 1 15
4½	½	2 0 4	10	⅝	5 4 26		1¼	21 3 24
	⅝	2 2 14		¾	6 2 14	22	1	18 3 18
	¾	3 0 21		1	9 0 8		1¼	24 0 23
5	½	2 1 10	11	⅝	6 0 11	24	1	20 3 5
	⅝	2 3 17		¾	7 1 7		1⅛	23 2 4
	¾	3 1 14		1	9 3 20		1¼	26 1 10

Jointing Pipes.—Lead and gasket or fine hemp rope and labour, for joints of socket pipes :—

Pipe—Diam. inter.	Inches. 4	6	9	12	15	18	24	30	36	42	48
Lead, lbs. per joint	6	9	14	21	29	38	48	59	70	82	94
Gasket, Pence ,,	4	6	8	10	12	15	18	21	24	27	30
Labour, pence ,,	10	15	20	26	37	45	60	75	90	105	120

Two rings or coils of gasket are generally used, about 1½in. wide together. Keep the pipes dry and the mouth of the clay ring oiled to prevent the explosive effect of the steam generated by the sudden contact with the melted lead. Clay only can be used for pipes up to 18in. diam., a leather strap or rope will hold the clay for 24in. pipes ; above this size use iron collars or straps in semi-circles screwed together with bolts at bottom and top, these fit closely to the required joint and are lightly covered with clay. The large pipes can be run with one melting of lead, if heated to a blue tinge ; after the joint is run it is caulked.

The cost of laying the pipes up to 9in. diam. would be about 20 per cent. more than for earthernware pipes (*See* Drainer), above this size as follows :—

Labor.—Making joints of 4ft. diam. cast iron water main pipe—Lead, $2\frac{1}{2} \times \frac{1}{2} = 150$lbs. lead.

Preparing single joint, melting lead, &c., two men, one day, 20/–. For a number of joints reckon 8/– to 10/– each.

Labor in carting one mile, lowering and levelling pipes and adjusting for joints :—

Diam. inches	12	15	18	24	30	36	42	48
Cost per lineal foot ...	1/8	2/4	3/–	3/6	4/2	4/8	5/4	6/–

The cost of excavation in hard clay or light shale to a depth of three feet including recesses for jointing, refilling 9in. layers, watering and ramming per lineal foot, will be about 50 per cent. more than last item for lowering, laying, &c.

Ends of Pipes.—The two flanges of a flange pipe, or the faucet end of a socket pipe, are equal in weight to from 8 to 11in. of the pipe.

WEIGHT OF A LINEAL FOOT OF CAST-IRON PIPES IN LBS.

Bore inches.	Thickness of metal.	Weight. lbs.	Bore inches.	Thickness of metal.	Weight. lbs.	Bore inches.	Thickness of metal.	Weight. lbs.
3		12.4	11	$\frac{1}{2}$	56.4	22	$1\frac{1}{8}$	254.9
		17.1		$\frac{5}{8}$	71.0		$1\frac{1}{4}$	284.8
		22.2		$\frac{3}{4}$	86.4	24	1	245.0
4		16.1		$\frac{7}{8}$	101.8		$1\frac{1}{8}$	276.9
		22.1	12	$\frac{5}{8}$	77.3		$1\frac{1}{4}$	319.3
		28.3		$\frac{3}{4}$	93.7	27	1	276.0
5		19.8		$\frac{7}{8}$	110.4		$1\frac{1}{8}$	311.0
		26.9		1	127.4		$1\frac{1}{4}$	348.0
		34.4	14	$\frac{5}{8}$	89.6		$1\frac{3}{8}$	384.0
6		23.4		$\frac{3}{4}$	108.4	30	1	305.0
		31.9		$\frac{7}{8}$	127.5		$1\frac{1}{8}$	345.0
		40.6		1	147.0		$1\frac{1}{4}$	384.0
		49.7	15	$\frac{3}{4}$	115.7		$1\frac{3}{8}$	424.0
7		27.1		$\frac{7}{8}$	136.1	33	1	335.0
		36.8		1	156.8		$1\frac{1}{8}$	378.0
		46.7		$1\frac{1}{8}$	177.7		$1\frac{1}{4}$	421.0
		56.8	16	$\frac{3}{4}$	123.1		$1\frac{3}{8}$	465.0
8		30.8		$\frac{7}{8}$	144.7	36	$1\frac{1}{8}$	411.0
		41.6		1	166.6		$1\frac{1}{4}$	458.0
		52.8		$1\frac{1}{8}$	188.7		$1\frac{3}{8}$	506.0
		64.3	18	3	137.9		$1\frac{1}{2}$	554.0
9		34.4		$\frac{7}{8}$	161.8	42	$1\frac{1}{8}$	478.0
		46.6		1	186.2		$1\frac{1}{4}$	532.0
		58.9		$1\frac{1}{8}$	210.8		$1\frac{3}{8}$	588.0
		71.7	20	$\frac{7}{8}$	178.9		$1\frac{1}{2}$	644.0
10		51.4		1	205.8	48	$1\frac{1}{8}$	544.0
		65.1		$1\frac{1}{8}$	232.9		$1\frac{1}{4}$	605.0
		79.0		$1\frac{1}{4}$	260.3		$1\frac{3}{8}$	669.0
		93.3	22	1	225.4		$1\frac{1}{2}$	733.0

Weight of Metals.—To find the weight in lbs. multiply the cubical inches of zinc by 25, cast iron, tin or white metal by 26, wrought iron or steel by 28, brass by 30, copper or gun metal by 31, lead by 41; cut off two figures to the right, the remainder will be lbs.

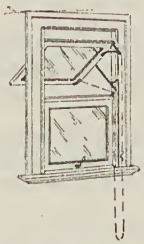
TABLE *of the Weight of a Superficial Foot of various Metals, in lbs.*

Names.	Thickness by the Birmingham Wire Gauge												
	1	2	3	4	5	6	7	8	9	10	11	12	
Iron	12.50	12.00	11.00	10.00	8.74	8.12	7.50	6.86	6.24	5.62	5.00	4.38	
Copper	14.50	13.90	12.75	11.60	10.10	9.40	8.70	7.90	7.20	6.50	5.80	5.08	
Brass	13.75	13.20	12.10	11.00	9.61	8.93	8.25	7.54	6.86	6.18	5.50	4.81	
	Thickness by the Birmingham Wire Gauge.												
	13	14	15	16	17	18	20	22	24	26	28	30	
Iron	3.75	3.12	2.28	2.50	2.18	1.86	1.54	1.25	1.00	0.80	0.64	0.50	
Copper	4.34	3.60	3.27	2.90	2.52	2.15	1.78	1.45	1.16	0.92	0.74	0.58	
Brass	4.12	3.43	3.10	2.75	2.40	2.04	1.69	1.37	1.10	0.88	0.70	0.55	
	Thickness, in parts of an inch.												
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	
Iron	2.5	5.	7.5	10.	12.5	15.	17.5	20.	25.	30.	35.	40.	
Copper	2.9	5.8	8.7	11.6	14.5	17.4	20.3	23.2	28.9	34.7	40.4	46.2	
Brass	2.7	5.5	8.2	10.9	13.6	16.3	19.0	31.8	27.1	32.5	37.9	43.3	
Lead	3.7	7.4	11.1	14.8	18.5	22.2	25.9	29.6	37.0	44.4	57.8	59.2	

STEEL SASHES.

Cast steel casement and frame made to certain sizes, ready to receive glass in one pane, with square head and hinged to open outwards, with fastenings complete, according to the design, at per foot super., 6/– to 9/–.

SIMPLE STAY SASH.



"Simplex" Opener, showing convenient and simple gear for opening and closing high sashes out of reach by hand.

For details, *see advt., pp.* 2, 20, 37.

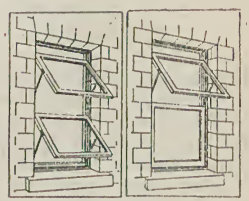
STEEL CASEMENTS AND SASHES.

The "Fenestra" Intersection Joint.

A small cross slot is made in the vertical bar and shaped to receive the flange and moulding of the horizontal bar to pass through; the moulded portion is then pressed out so as to fold closely round the mould of the horizontal bar. It has a small notch made to act as a lock. The amount of metal removed in making a "Fenestra" joint is in its favour compared to the usual mitred joint.

Rolled Mild Steel Sashes and Frames, 1 x ⅛in. upwards, casement or pivot hung, with or without frames, per sup. ft., unfixed, from 6/–.

Rolled Steel Reversible Casements



(Marks' patent), from 9/– per super. foot unfixed.

The above steel sashes are sometimes built in during erection of building, with ties at side and lead plugged, or lead joints made.

"Waterloo" Steel Window Frames, from 6/– per super. ft., Melbourne.

Rolled Steel Framings for Domes and Conservatories.

For prices and details, see advt., pp. 2, 20, 37.

Ornamental Punched Steel Sheets, plain and embossed, from 14in. to 19in. gauge up to 8ft. x 4ft., suitable for lift enclosures, open panels, &c., per square foot ... 1/– to 2/6

Brady's Steel Roller Shutters, from 6/6 per super ft.
For Partitions, Openings Factories and Shops, *see advt., pp.* 17, 20, 37.

Mild Rolled Steel Ovolo Moulds (with stop ends).
For staff bends and external angles, plain and ornamental.
1½in. to 2½in. wide, per foot, from ... ... 6d. to 1/–
Rolled Steel Ornamental Balusters, Mouldings, Hand Rails.
For details, designs, &c., see advt., p. 37.

Cutting Rolled Steel Girders through with Oxygen.

The Knowles Oxygen Co. of Birmingham gives the cost of cutting through 15in. x 15in. R.S. girders at 42 different places :—

	£	s.	d.
Oxygen used, 200 c. ft., at £2 per 1000 c. ft.	0	8	0
Hydrogen used, 300 c. ft., at £1 per 1000 c. ft.	0	6	0
Labor and Time Specialist working machine, 5 hours at 4/–	1	0	0
Net cost	£1	14	0

About 9d. per cut.

GIRDERS.

Compound Girders, up to 2ft. deep, for general building purposes, are usually made by one or more steel joists riveted to plates top and bottom, which give additional strength to the joists in compression and tension strains according to thickness of plates.

Thus, two joists, 18in. x 7in. at 20ft. span (see combined safe load as per table steel joists, 32 tons each) = 64 tons.

But with two plates, 16in. x ⅝in. riveted to top and bottom flanges, the combined safe load should be 82½ tons, increasing the strength 25 per cent. or more.

Compound Girders, with top plate riveted on every 12 inches, 30/– per cwt.

Ditto, top and bottom plates riveted on, 25/– per cwt.

Hoisting and setting, reckon 2/6 to 4/– per cwt. per floor.

STEEL GIRDER BRIDGES.

Labor only. Per cwt. including scaffolding.

Wages of Fitter, 3/–, and Holder-up, 2/3 per hour.

	£	s.	d.
Fitting and riveting large lattice girders, previously put together, over land bays and spans	0	8	8
Ditto, ditto, over water, rivers, &c.	0	10	0
Riveting only, per 100 rivets, from 11/– to	1	5	0
Ditto, ditto, with machine, from 3/3 to	0	8	4
Making, punching, riveting, constructing, fitting, and fixing large plate girders for bridges, &c.	1	10	0
Ditto, lattice or triangular girders, or large tanks	2	0	0
Ditto, small box or plate girders for floors, shop windows, &c., small tanks, caulked...	2	4	0

Add 25 per cent.

Steel Girder Bridges, general average price per ton, £19.

AWNINGS.

City Specification.

Awnings to be constructed of approved designs, in steel scantlings, T and angle iron well primed in red lead.

Rivets to be ½in. dia., countersunk where necessary.

Rafters to be spaced at not more than 8ft. centre to centre.

Trusses to be constructed as shown and fixed at ends of awning and where practicable.

Suspension Bars, 1in. x 1in., to have screw coupling, and spaced as required.

Roof covered with 24G. Gal. Cor. Iron secured with galv. iron clips, lead washers and nuts, junctions with adjoining roofs to be made water-tight by overlapping 6in.

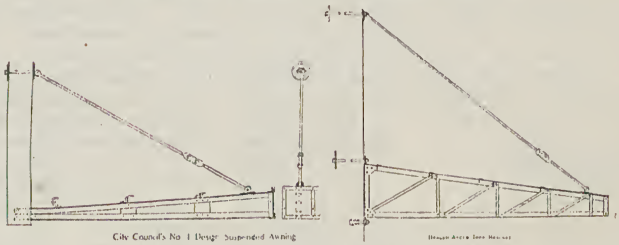
Flashing to be in 5lb. lead let into joint 1½ and pointed in cement.

Gutter 22G. Gal. Iron, riveted and sweated at joints, discharging into 4in. x 3in. cast iron down pipes let flush into walls and carried under footpath into street gutter.

Return ends of awning to be similar to Fascia, any space caused by variation in height of awnings, is to be filled in approved manner, and curved around at street corners.

Awnings to be fixed to the satisfaction of Inspector, and be kept in perfect condition and repair, and roof, gutter, and downpipes to be kept perfectly clean and watertight. Awnings to have ceiling of approved materials on strong firring, and finished to a horizontal surface.

SUSPENDED STREET AWNINGS.



City Council's No. 1 Design Suspended Awning

BRACED SUSPENDED AWNING

T AND L IRON AT £21 10s. PER TON.

12 FEET WIDE, PER FOOT RUN.

Type Design.	heavy	light
No. 1.—Suspended steel awning, wall gutter, net ...	...30/–	25/–
No. 1.—Suspended steel awning, fascia gutter, with R.S.J. cantilever; built in 6ft.		
Special Prices for Conditions of Building.		
No. 2.—Suspended steel awning, **fascia gutter** ...	...27/6	21/–
No. 3.—Suspended steel awning, **fascia gutter, light type**	25/–	20/–

N.B.—**Underside** of awning fascia to be 11ft. from kerb to footpath —mean level and to width of footpath.

Allow for hold back stays to one-storied shops.

DIVER AND CYLINDER.

Diving Apparatus complete in the Australian cities from £150 to £200. Two men can work the air pump to a depth of 51 feet.

In a diving bell men can work for several hours at this depth under a pressure of 37½ lbs. per square inch. At a depth of 90 feet they can work only for about an hour without seriously suffering from paralysis.

Iron cylinders, for bridges, wharves, &c., are sunk by Triger's *plenum process,* which consists in forcing air into the cylinder to such an extent as to force out the water below the bottom of the cylinder, leaving the earth or soil nearly dry; the men pass in and out of the cylinder by an *air lock,* which is generally of the same diameter as the cylinder, and about 6ft. high; it is secured to the top of the cylinder, and is fitted with air-tight valves at top and bottom, through which the men pass. These men are entirely at the mercy of those employing them, and may be injured for life by paralysis, caused by working too long, or at too great a depth. The laws relating to the supply of air, &c., are similar in their results to those relating to the diving dress and diving bell. The iron cylinders of the Darling Harbour Wharf, Sydney, and the Parramatta River iron girder bridge, near Sydney, were sunk by the *plenum process.* See "Trautwine's Engineer's Pocket Book." See Metal Worker.

STEEL STRONG ROOM DOORS.

With Flat Bar Frame.

Hung on hard steel centres in frames. Fitted with working bolts at front and back edges of the doors for security. The doors are lined throughout with non-conducting and fire resisting composition. The working bolts are secured with Chubb's Patent Anti-Explosive Lock with duplicate keys. The doors are fitted with a patent drill preventive, and the locks are further protected with a layer of armour plate

*Sizes kept in Stock		Quality A.	Quality B.	Quality C.
Sizes.		Quality A. has no Fire Resisting Chamber.		
ft. in.	ft. in.	£ s. d.	£ s. d.	£ s. d.
6 0 x 2	6...	24 15 0	33 6 0	36 5 0
6 0 x 3	0...	28 5 0	34 12 6	41 15 0
*6 2 x 2	8...	27 10 0	35 5 0	40 5 0
6 6 x 2	6...	25 17 6	33 12 6	36 17 6
*6 6 x 3	0...	30 5 0	39 0 0	43 10 0

Sizes		Quality D. with Lock.	Quality E., with Lock.
ft. in.	ft. in.	£ s. d.	£ s. d.
5 9 x 2	3...	26 7 6	29 10 0
6 0 x 2	4...	31 2 6	35 12 6
6 2 x 2	6...	35 0 0	42 12 6
6 2 x 2	8...	40 2 9	48 10 0
6 6 x 2	6...	39 0 0	47 5 0
6 6 x 3	0...	49 5 0	59 12 6
6 9 x 3	4...	57 0 0	69 2 6

All sizes stocked. Quality E. used for Branch Banks.

Chubb's Strong Room Steel Plate Shelving, with perforated uprights for spacing, per lb., 6d. Detail prices for quantities on application.

P.O., Maroubra, cost price £65,

METAL WORK.

ALUMINIUM.

(Extracts from Richards on Aluminium.)

Aluminium is the lightest of commercial metals, $\frac{1}{3}$ as heavy as iron, hard as copper, very ductile and easy to cast in iron or sand moulds, and hardens more when being worked.

Being non-magnetic and non-tarnishing, it can be used for electrical work where a magnetic metal would be useless, but the electrical conductiveness is 34 per cent. less than copper, and requires less annealing than copper. With the exception of lead, it unites readily with all the common metals.

Hydrochloric acid is its natural solvent.

For light structural purposes it is invaluable.

Pittsburgh Reduction Company, Niagara Falls, have the largest works and output.

ALUMINIUM.

Weight of per square foot in lbs. and decimals.

Gauge.	Weight per square foot.	In Sheets 24in. x 96in.
12	1.406lbs.	11¼lbs.
16	.906 ,,	7¼ ,,
18	.687 ,,	5½ ,,
20	.25 ,,	4 ,,

A cubic foot of Aluminium weighs 166lbs.

Price of Aluminium. Subject to fluctuation.

Ingots, per lb., 5/–; Sheets, per lb., 5/6; Round Bars, per lb., 7/6; Flat Bars, per lb., 8/–; Wire, per lb., 6/6.

COPPER AND ITS ALLOY.

Metal Manufactured.	Copper.	Zinc.	Nickel.	Tin.	
German Silver	60%	20%	20%	—	100 pts.
White Metal	56%	5%	39%	—	100 pts.
Gun Metal	90%	—	—	10%	100 pts.
Bell Metal...	80%	—	—	20%	100 pts.
Rolled Brass	60%	40%	—	—	100 pts.
Flexible Bronze	95%	—	—	5%	100 pts.

MELTING POINTS OF METALS.

(Prof. Roberts-Austen.)

	Deg. Fahr.		Deg. Fahr.
Aluminium (pure) ...	1,289	Mercury	—39
Antimony	810	Nickel	2,810
Bismuth	510	Platinum	3,080
Brass	1,650	Steel (hard)	2,570
Silver	1,733	Steel (mild) ...	2,687
Gold	1,913	Tin	446
Iron (cast) ...1,920 to	2,012	Zinc	779
Iron (wrought) ...	2,912	Copper	1,929
Lead	612		

SHRINKAGE OF CASTINGS.

(From Pattern Maker's Rule.)

Aluminium, Brass, Copper, Zinc	$\frac{5}{16}$in.	Tin ...	... 1/12in
Cast Iron, and Lead	$\frac{1}{8}$in.	Steel	$\frac{1}{4}$in.

SOLDERS.

(From Metal Trade Referee.)

For **lead**	1 part tin, 2 parts lead.
For **brass**	2 parts brass, 1 part zinc.
Hard solder	2 parts copper, 1 part zinc.
Soft solder	2 parts tin, 1 part lead.

FLUXES FOR SOLDERING.

Tinned iron	Resin or spirits of salts.
Copper and **brass**	Sal ammonia or spirits of salts.
Zinc	Spirits of salts, **Lead**, Resin.

SHEET COPPER *(per square foot)*.

At £70 per ton. *Varies to* £140 *per ton.*

Size of Sheets.	6ft. x 3ft.		6ft. x 4ft.	
Gauge	28	26	24	22
Approx. weight ...	12oz.	15oz.	1lb. 2oz.	1lb. 7oz.
Price per lb.	1/4	1/3	1/3	1/3

Present Price, 2/6 per lb.

Size of Sheets	6ft. x 4ft.			
Gauge	20	18	16	14
Approx. weight ...	1lb. 12oz.	2lb. 4oz.	3lb.	3lb. 12oz.
Price per lb., cut ...	11d.	to		1/3

Present Price various sheets.

Gauge	28	26	24	22	20
Sheet Copper	2/3	2/6	2/9		
Lined and Polished ...	3/–	3/3	3/6		
Sheet Brass	1/9	2/3	2/6	2/9	3/–

BAR COPPER *(per pound)*.

At £70 per ton.

Round—	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$ to 1$\frac{1}{4}$in.
By the Bar ...	1/5	1/3	1/2	1/1lb.
Cut Bars	1/7	1/4	1/3	1/2lb.

Square, 1$\frac{1}{4}$, 1$\frac{1}{2}$, 1$\frac{3}{4}$ inches—By the Bar, 1/1 ; Cut Bars, 1/2 per lb.

RELATIVE WEIGHT OF WOODEN PATTERNS AND METAL CASTINGS.

One pound Weight of Pattern in	Corresponding Weight of Casting in pounds.				
	Cast Iron.	Zinc.	Copper.	Yellow Brass.	Gun Metal.
Mahogany	8	8	10	9.8	10
White Pine ..	14	14.5	18	17.5	17.8
Yellow Pine ..	13	12.6	16	15.5	16
Cedar	11.5	11.4	14.5	14	14.5
Maple	10	9.8	12.5	12	12.4

SHEET ZINC.

Perforated (7ft. x 3ft. Sheets).

8 hole x 7 gauge, 3/6 per sheet, or 2d. per sq. ft.

$\frac{3}{16}$ to $\frac{7}{8}$ hole x 12 gauge, 7/– per sheet, or $4\frac{1}{2}$d. per sq. ft.

ZINC GAUGES AND WEIGHTS.

Zinc Gauge	Ounces per square Foot.	Approximate Weight per Sheet.							
		7 x 2.8		7 x 3		8 x 2.8		8 x 3	
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
4	abt. 5	5	13	6	9	6	11	7	8
5	,, 6	7	0	7	14	8	0	9	0
6	,, 7	8	3	9	3	9	$5\frac{1}{2}$	10	8
7	,, 8	9	5	10	8	10	10	12	0
8	,, $9\frac{1}{2}$	10	8	11	13	12	0	13	12
9	,, 11	12	13	14	7	14	11	16	8
10	,, 13	15	3	17	1	17	5	19	8
11	,, 15	18	7	19	11	20	0	22	8
12	,, 17	19	13	22	5	22	11	25	8
13	,, $19\frac{1}{2}$	22	12	25	$9\frac{1}{2}$	26	0	29	4
14	,, 22	25	11	28	14	29	5	33	0
15	,, 24	28	0	31	8	32	0	36	0
16	,, 26	30	5	34	2	34	11	39	0
17	,, 30	35	0	39	6	40	0	45	0

Mem.—If sheet zinc contains any *iron* in its composition, it will not resist the action of the air, and is no better than damaged or inferior galvanised iron. It is essential that it should be perfectly malleable, or it will crack with too sudden changes of temperature; the best test of its malleability is to double the corners backwards and forwards, which ought not to crack it.

Care must be taken to allow for *contraction* and *expansion*, which may be effectually guarded against if properly laid.

Labor to zinc and galvanised iron is about the same. *See* Plumber.

APPROXIMATE WEIGHT OF ONE CUBIC INCH OF VARIOUS METALS.

	lbs.		lbs.
Platinum	0.78	Nickel	0.31
Gold	0.69	Wrot. Iron	0.28
Mercury	0.49	Steel	0.28
Lead	0.41	Cast Iron	0.27
Silver	0.36	Tin	0.26
Bismuth	0.35	Zinc	0.26
Copper	0.32	Antimony	0.24
Brass	0.31	Aluminium	0.094

STAMPED STEEL CEILINGS.

Ceilings—	Material. per sq. yd.	Labor fixing Ceilings including battens
Diapers, from	2/6 to 3/–	4/– per sq. yd.
Panelling	2/11 to 3/6	5/– ,,
Embossed Ceilings	From 3/6	7/– ,,

Steel Cornices in stock lengths of 6ft.

2½in. girth	... ...	1/1½	
3in. ,,	... ...	1/3½	
4in. ,,	... ...	1/7	
6in. ,,	... ...	2/3	
9in. ,,	... ...	3/2	
12in. ,,	... ...	4/1	
15in. ,,	... ...	5/1	

Embossed Steel Cornices—

3in. girth	... ...	–/3½	
4in. ,,	... ...	–/5	
6in. ,,	... ...	–/5	
9in. ,,	... ...	–/7½	
12in. ,,	... ...	–/9½	
15in. ,,	... ...	–/11½	

Mitre leaves at rate of one foot of corresponding cornice.

Prime cost items may be reckoned at the above rates.

Labor, Fixing Cornices, including Bracketing, 4d. to 9d. per ft. run. according to girth.

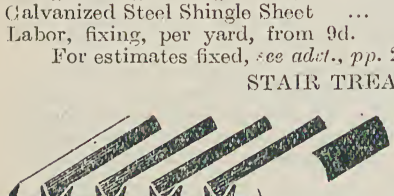
Embossed Metal Sheets for Exterior Walling.

Rough Cast Sheets in Gal. Steel	8/9 per sheet, 6ft. x 3ft.
,, ,, ,, ,, ...	5/10 per sheet, 6ft. x 2ft.
Brick Sheeting in Gal. Steel	8/9 sheet, 6ft. x 2ft. 11in
Fish-scale Sheeting in Gal. Steel	8/9 per sheet, 6ft. x 3ft.
,, ,, ,, ,, ...	5/10 per sheet, 6ft. x 2ft.
Galvanized Steel Shingle Sheet	8/9 per sheet, 6ft. x 3ft.

Labor, fixing, per yard, from 9d.

For estimates fixed, *see advt., pp.* 2, 26.

STAIR TREADS.



Stair Tread, polished corrugated brass, drawn, and nosing protector, per ft. run, with 2½in. width nosing 3/–

Stair Tread, cast brass, chequered ... 1/6

All lead 3in. with ¾in. nosing, per ft. run ... 1/6

ead filled treads, 3½in. wide, without nosing, per it. run ... 1/6

Lead filled treads, 2¼ in. wide, without nosing, per ft. run 1/–

All Brass, 1½in. nosing and flange 1/6

Ditto, 2in., without nosing 2/3

Ditto, 2in. with nosing 2/9

Ditto, 2½in. brass, with nosing... ... ... 3/–

Cut to sizes and drilled. McIlwraith & Co. Pty., 310 Pitt St.

For details, *see advt., p.* 14.

Composition Stair Treads, per ft. run, 2in. wide, 10d.; 3in., 1/3; 4in. ... ... £ s. d. 0 2 0

See advt., pp. 2, 14, 26.

Triangular Brass Stair Rods, 27in. x ⅜in., per doz	1	5	0
Eyes to suit, per doz. ... ... 5/– to	0	6	0
Ditto, 27in. x 1in., per doz.	2	0	0

METAL LETTERS.

Roman Type, with Folts. Plain, Zinc.

6in. High, 7/6 ea. ; 9in. high, 9/– ; 12in. high, 11/– ; 15in. high, 12/6 ; 18in. high, 14/6.

METAL ENCASED MOULDINGS FOR SHOP FRONTS.

White Metal, " Silverite," Bronze, Copper, and Brass.

Catalogues issued on application.

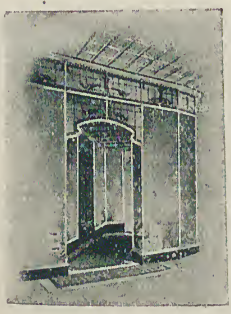
12ft. to 18ft. lengths without jointing metal.

Material without fixing.	Per ft. run s.	d.
Corner posts, ⅝in. x ⅝in.	1	3
Ditto, 1in. x 1in., flat...	1	6
Ditto, 2in. dia., round	2	6
Wood size, 3in. x 1⅞in., quarter round, rebated	1	8
Ditto, 1¼in. x 1¼in., quarter angle	1	8
Ditto, 1½in. x 2½in., ogee and bead base	2	6
Intermediate meeting, 2in., dia., ½ round 2/– ; flat	1	6
Ditto, Scotia or Torus ... ... 1/– and	1	6
Top mould, 2in. dia., ¼ round	1	6
Base moulds, 3 ovolo, O.G. ... ... 4/– to	2	0
Small cover moulds ... ... upwards	0	8
Side sash, single lamb's tongue, 2in. x ⅞in., per ft.	2	6
Caps and Bases, for 2in. to 3½in. dia. bar, each ... 7/6 to	15	0
Stamped **egg and dart** mould, 2in. dia., per ft.	2	9

Zinc moulds 10 per cent. less than above.

Labor, Shop Window, Fixed Complete.

	£	s.	d.
Copper, Bronze, Brass, or Nickel columns, for shop fronts, 2in. dia. up to 18ft. long, with caps and bases, fixed complete, each, with 2 returns	3	0	0
Brass Metal boards, for foot of show windows, 9in. wide, per lineal foot, according to design ... ... 10/– to	7	10	0



SHOP FRONT WINDOW OF PLATE GLASS.

Framed in metal covered mouldings, has developed to a distinct branch of joinery. *See Metal Worker's.*

Prices according to design.

See Advt p. 3.

For further information, see advt., pp. 2, 26, 37.

LIGHTNING CONDUCTORS.

Market Price of Copper, £90 per ton.	£	s.	d.
Lightning Conductors, **tape**, 1⅛in. x ⅛in., per 100ft. ...	8	0	0
Ditto do do rope, ½in. dia., per 100ft. ...	9	0	0
Elevating **tune** and **terminals**, complete	3	4	0
Copper **Earth Plate**, 24in. x 12in. x ¼in., each	1	5	0
Lightning Arresters, Automatic, each	2	5	0
Plain solid **copper point**, with coupling for rope end, and copper elevating tube, 4ft. long	2	5	0
Copper holdfast clips, each 6d. Insulators, each	0	1	0

In using copper tubes or hollow balls it is necessary that all points of junction or contact should be sweated or soldered so that the inside cannot be impaired by dust or dirt.

Labor, fixing, from, per ft. run ... ... 1/– to 1/6

Angle Strips or Staff Beads, steel, **Wall Corner Protectors** with anchor attachment, per ft. ... 6d. to 1/–

GUN AND MUNTZ METAL.

Per lb., including patterns and fixing.	s.	d.
Gun metal to top railing and curved balusters of lighthouse ...	3	0
Ditto casements about 30lbs. each, size 24in. x 12in.	4	0
Ditto sluice valves to sewer pipes	3	6

For the weight of muntz metal sheets, reckon the same weight as brass. *See* Index.

SHEATHING PILES.

Sheathing piles with 20oz. muntz metal to 18in. below rock on planted piles, and 6ft. below ground, on driven piles, including 1½in. muntz metal nails for ditto, ¾lbs. to each sheet, size of sheets, 48in. x 14in.	2	6	
Fixing No. 20 gauge muntz metal ,round piles from 10 to 20ft. under water, including nails, as before	4	0	

DIVER.

Diver's Wages, 29/6 per hour, Award, 1923 ; Attendant, 18/– hour.

N.B.—The charge for a diver and two attendants, including all necessary apparatus, is £5 to £7 per day from 9 a.m. to 4 p.m. A diver will nail on to piles about 14 sheets of muntz metal per day.

Diving Apparatus, complete in the Australian cities, from £150 to £200.

RECIPE PIPE JOINT.

Cement for Iron Pipe Joints.

Ten pounds of ground litharge, best quality, four pounds of best Paris whiting, one-half a pound of yellow ochre, two pounds of dry red lead, one-half an ounce of hemp cut into half-inch lengths ; mix well with boiled linseed oil to the consistency of thick putty ; make joints in usual way. The above mixture will set quick when heat is applied. It repairs boilers, resists fire, and will set in water.

MASONRY.

In estimating the cost of **cubed** or **dimension stone** at per *cubic foot*, first take the average size of the stones required, and the cost of such stones delivered on the work. Take next the number of superficial feet of face-work on the stone, then the number of feet super, of dressed beds and joints in the same stone, add the cost of setting the stone, and you cannot fail to arrive at a correct estimate of the net cost and description of masonry, to which add profit according to the total cost of the work and the time required to finish it.

The different portions of masonry should also be classed as follows, if estimating at per cubic foot :—

One-face work, as ashlaring, or common face-work, base courses, plinths, friezes, &c.

Two-face work, as quoins, imposts, architraves, parapets, &c.

Three-face work, as copings, strings, cornices, pilasters, &c.

Four or more face work, as newels and caps, to ditto, blocks to cornices, chimney caps, &c. By such means the defective system of estimating may be pruned of much of its uncertainty ; the proper, because the most correct method, being to estimate the rough stone at per cubic foot, and the labor in dressing at per foot super.

Tooled margins, if round rock or quarry face, which is not measured, to be taken by the foot super, at double their width.

Raised work to be measured as *flat* work, the margins being taken as sunk work.

Masonry and stonecutting.—The remarks under these headings will include every description of stonework. The setting or fixing and mortar is generally added to the cost of stone at per cube foot. All metal work, such as joggles, cramps, bolts, &c., or running in lead or sulphur is reckoned by the pound.

N.S.W. MASONS' AWARD, 44 hours 24th June, 1924) :—

	Rate per hour
	s. d.
Stone Carvers	3 8
Stone Carver's Assistant	3 3
Stone Machinist	3 1½
Operating Surfacing	3 1¾
Planing Machine	3 0
Stone Polishers	2 3
Polishers' finishers	2 4½
Stone Masons	3 0

Sawyers, 2/3½ ; Adult Assistant, 2/1½ ; Youths, 30/- to 70/- per week.

Rubble and Stone Masons, building trade, 3/- ; Setters, 3/2. Stone Setters, 3/1½ ; Rubble Masons, Kerb and Gutter, 2/6. Rubble and Stone Mason's Labourer, 2/3.

LABOR RUBBLE MASONS' AWARD, PIECEWORK.

Per Perch of 16½ feet x 18 in. or less.

	s.	d.
No. 1 Random Rubble Uncoursed (Hammer Dressed).	8	9
Class 2—Random rubble built in courses	10	2
Class 3—Squared rubble (uncoursed)	20	6
Class 4—Squared rubble built in courses	20	6
Class 5—Coursed rubble	19	1

In all classes of work above 5 feet in height, a further 2/6¾ per perch extra, and a further 2/6¾ for each additional 5 feet in height.

FOUNDATIONS AND DIMENSION STONES.

Scappled Stone at Different Australian quarries.

Wages, 3/– per hour.

	Free-stone. s.	d.	Blue-stone. s.	d.
Footings in 12in. through stones, per perch of 25 cubic feet	34	0	36	0
Parapet, scrappled on both sides, per perch, 25 cubic ft.	50	0	52	0
9in. ashlar, 33 lin. ft., per perch	34	0	34	0
Rubble, per perch, of 25 cubic feet	7	0	11	0
Lintels, steps or sills (12 x 6), at per lin. ft. ...	2	0	2	6
Cartage, per perch, rubble	6	0	10	0

DIMENSION STONES.

Dimensions, stones, from 6 to 12 cubic ft., per cubic ft.	3	0	3	6
Ditto, 12 to 24 cubic feet	3	6	4	6
Ditto, 24 to 36 cubic feet	4	0	5	0
Ditto, 36 to 48 cubic feet	5	0	5	6
Ditto, 48 to 60 cubic feet	6	0	7	6
Flag stones, rough, 4 inches	2	0	4	0

If more than 4 ft. deep on natural bed one-third more than these prices.

CURBS, GUTTERS, CUBES.

	s.	d.	s.	d.
Cubes or paving stones, 4 x 9 x 12, or 15in., per cup. yard...	9	0	16	0
9in. pitchers, 9 x 9 x 9, per super. yard	8	0	14	0
Curbs, for footpaths, c., 13 x 6, p.l.f.	1	6	2	0
Ditto, 18 x 8	2	0	2	8

GRINDSTONES.

Grindstones, 6in. wide :—2ft. dia., 20/–; 2ft. 6in., 28/–; 3ft., 50/–; 3ft. 6in., 70/–; 4ft., 120/–; 4ft. 6in., £8.

Ditto, 10in. wide :—3ft. dia., 70/–; 3ft. 6in., 94/–; 4ft., 150/–; 4ft. 6in., 200/–.

Gate Cap.—An octagon pointed or pyramidal gate cap in Sydney freestone, about 22in. by 22in. by 30in. high, took a stone-cutter 48 hours to dress it, or at the rate of 6 hours per cube foot; this at 3/– per hour = 18/– per cube foot for labor only without *sharps* or profit.

Curved Pediment in Sydney freestone, with cornice under; size of stone, 6ft. 8in. x 2ft. 4in. x 2ft. = 31 cubic feet.

	£	s.	d.
Beds and joints, 25ft. x 2ft. = 50 super. feet at 1/3... ...	3	2	6
Rubbed curved face, 3ft. x 1ft. = 3 super. feet at 3/– ...	0	9	0
Ditto curved and moulded, largest girt, 30 super feet at 6/–	9	0	0
Banking and superintendence, 31 c. ft., at 7d.	1	0	0
8/9 per cubic foot for labor only = ...	13	11	6
All materials add 31 cubic feet stone at 2/–	3	2	0
Setting and cement mortar, 31 cubic feet at 2/6	3	2	0
	19	15	6

31 cubic feet = 12/9 per cubic foot cost price.

Galvanised iron cramps and bond irons about $2\frac{1}{2}$ x $\frac{1}{4}$, used in Government buildings in Sydney, equal to about 1lb. to 5 cubic feet of masonry.

SANDSTONE QUARRIED AND DRESSED.

Pyrmont Stone.

	Per foot. s.	d.
Window sills, 12 x 6, weathered and throated, 3ft. to 7ft. daylight	6	0
Ditto, sunk, weathered and throated	7	0
Ditto, larger sills, per cubic foot	7	0
Steps, 12 x 6, tread and riser, dressed, bedded and jointed ...	5	0
Copings and plain, 10 x 12, one clean face, and cham., from ...	6	0
Ditto, splayed and throated, 12 x 6, two clean faces and cham., from	7	0
Round Top, 12 x 3, for steps and garden coping	3	0
Kerb and Guttering, 12 and 18 x 9, sawn faced	5	4
Building Rubble, at Sydney and suburban quarries, per perch ($16\frac{1}{2}$ feet)	7	0
Squared Rubble, ditto, per perch ($16\frac{1}{2}$ft.)	12	0
Base Course, 12 x 12, per cubic foot	2	0

Memorandum.

Mortar required, per perch—

Rubble contains about 5 cubic feet of mortar.

Ashlar, about 2 cubic feet.

Solid Masonry, from 1 to $1\frac{1}{2}$ cubic feet.

To obtain these proportions of mortar, use one bushel of sand for each cubic foot of mortar required, in addition to the usual proportion of stone lime.

The Oamaru Free Limestone is similar to the South Australian free limestone, is very soft and easily cut with handsaw. (See Building materials of South Australia at the end of this book.)

LABOR ONLY, PER FOOT SUPER.

Wages, 3/– per hour.

	s.	d.	Spring Bay Sandstone s.	d.	Bluestone or Basalt. s.	d.	Sydney Sandstone s.	d.
Labour Sydney Sandstone—								
Clean Chiselled, per square foot	3	6						
If Rubbed	...3	0						
Joints and Beds	...1	3						
Punched Work	...0	8						
Pitched quarry face			0	2	0	4	0	2
Axed, dressed for beds and joints			1	6	3	0	1	3
Axed and draft			1	9	3	6	1	6
Clean chiselled sandstone			3	0	6	0	2	6
Clean chiselled and rubbed			3	6	—		3	0
Punched work			0	9	1	4	0	8
Vermiculated work, sharp arrises			6	0	12	0	5	0
Special turned Sydney sandstone, md. pillars, 2ft. x 6in. x 6in. cost each, 20/– each								
Mouldings, tooled and rubbed large per foot super			4	0	8	0	3	4
Mouldings tooled and rubbed under 6ft. ...			6	0	12	0	5	0
Ditto, close members per foot run.								

Gothic or undercut mouldings, one half more on account of extra sinking and undercutting.

Machine cutting, dressing and moulding prices have been reduced from 20 per cent., according to quantity of each kind and dimensions.

LABOR ON VARIOUS STONES.

Wages 3/– per hour.

For Bowral Trachyte, reckon 3 times on Sydney sandstone.

If in **Cooma,** N.S.W., **Soft Granite,** reckon the same as for bluestone.

For **Brisbane** or **Mount Somers Sandstone** reckon same as for Sydney sandstone.

If in **Moruya,** N.S.W., **Grey Granite,** or **Adelaide marble,** or the **Grampian** (Vic.) **Granite,** reckon one-half more than bluestone.

But if in **Gabo Island Red Granite,** or **Harcourt** (Vic.), **Grey Granite,** reckon double the cost of similar work to bluestone.

THE RELATIVE PROPORTION

For fine axed or finest chiselled plain face per super. foot is—	s.	d.
For **Camaru,** New Zealand, **Free Limestone**	1	0
Barrabool Hills or **Darley Free Sandstone**	1	6
Waurn Ponds Free Limestone	1	10
Sydney sandstone, Pyrmont, Mount Somers or Brisbane Free Sandstone	2	6
Spring Bay Sandstone	3	0
Brisbane Porphyry	4	0
Stawell Sandstone	4	0
Bluestone, or Cooma Granite	6	0

Adelaide marble, or Grampian (Vic.) or **Moruya** (N.S.W.) Granite, 9/6 to 10/6.

And for **Gabo Island** or S.A. **Red Granite,** or **Harcourt Granite,** 13/6 per super. foot.

RELATIVE COST OF STONECUTTING MOULDINGS.

Labor only, per foot run, 3/–.

	Sydney Sandstone.	Spring Bay Sandstone.	Oamaru Stone
	s. d.	s. d.	s. d.
Single bead, reed or flute, ¾ inch or inch ...	1 0	1 4	0 6
Double, do., do....	1 4	1 8	0 8
Treble do. or moulded	2 0	2 6	1 0
Diminished flutes, from 1 inch to 2 inches diam.	1 6	1 10	0 10
Ditto, from 2 to 3 inches do.	2 0	2 6	1 0
Ditto from 3 to 4 inches do.	2 4	2 10	1 2
Ditto, from 4 to 5 inches do.	2 6	3 2	1 4
Add one foot for each mitre in panels or returns.			
Holes jumped or drilled for bolts, &c., per foot by pat. air compressor drills, 1½ dia.			
Ditto ditto, 2 inches diameter	5 0	6 0	2 0
Ditto do. 3 inches do.	6 0	7 6	3 6
	7 0	8 6	4 0
	9 0	10 0	5 6

Brisbane and Mount Somers Sandstone, same as Sydney sandstone.

Detail Stone Cutting *Labor only each.*	Sydney Sandstone. s. d.	Spring Bay Sandstone. s. d.	Oamaru Freestone s. d.
Mortice for iron rails, &c., 1 inch sq.... ...	0 10	1 0	0 6
Ditto do. 2 do.	1 0	1 4	0 8
Ditto do. 3 do.	1 6	1 10	0 10
Dentules, 2 inches deep on face, with band	0 10	1 2	0 6
Ditto, 4 do. do.		1 10	0 10
Triglyphs and guttæ or drops, for 12 inch Doric column	6 0	8 0	3 6
Ditto, 24 inch do.	9 0	10 6	5 0
Ball for foot or finial 6 inches diam.	15 6	20 0	8 0
Ditto 8 do.	18 0	21 0	10 0
Ditto 12 do.	20 6	23 0	12 0
Balusters, either round or square, if 4in. largest diam., or side, and 12in. high	18 0	23 0	10 0
Ditto, if 4in. diam., or side, and 18in. high ...	20 0	25 0	10 6
Ditto, 8in. do. and 24in. high ...	22 0	28 0	12 0

STONE SETTING.

Average cost of architrave jamb, 10ft. x 2ft. x 1ft., front and reveal rubbed, including mouldings, 21in. girt, reveal bevelled, side checked, all other faces clean chiselled, *cost* 9/– *per cube foot, labor only,* in Sydney sandstone, exclusive of setting, mortar, cramps, stone, &c.

Proportionate cost of sunk and circular work.—Sunk work, 3in. deep, one-fourth more than similar straight work.

Sunk work, 6in. deep, one-half more.

Circular work, from one-third to one-half more than similar straight work.

Circular-circular or spherical, from two to four times, according to sharpness of curve.

SETTING CUBE STONES.

Labor and Mortar, per foot cube.

	s.	d.
Setting ashlar facing, 4½in. to 14in. on bed and less than 1½ c. ft.	1	4
Setting freestone, bluestone, or granite in blocks not more than 3 cubic feet, including scaffolding, haulage, cramps, lewis and grooves	1	0
Ditto, if carved or moulded, do.	1	4
Ditto, block from 2ft. to 6ft. long, do.	1	6
Ditto, do. if moulded or carved above 6ft. long	2	3
Dressing and **setting** Footings, per perch	15	0
Ditto. do. Rubble in walls, per perch. See award 9/– to 20	0	

For every 10ft. in height above 40ft., add one-fourth the above rates. One lb. cramps will do from 5ft. to 10ft. of masonry.

CARTAGE.

Carting bluestone, granite, or sandstone, one mile, per ton. (*See* "Weight of Materials") ... ... from 3/6 to	5	0	
Add for each mile beyond, per ton	1	6	
Carting rubble, per perch (measured in wall), one mile 5 0 to	8	0	
Add for each additional mile ... ... 1 6 to	2	0	

EXAMPLES OF ESTIMATING.

Stone Cornice (Sydney freestone) on 14in. brick wall.

	s.	d.
Stone delivered 2.0 x 1.0 = 2 cube feet at 2/6	5	0
Setting and mortar, 2 cubic feet at 1/6	3	0
Mouldings, 24in. girt, cut and rubbed, 2 sup. feet at 5/– ...	10	0
Weathering, chiselled and rubbed, 1 sup. foot	3	0
Beds and joints, about 3 sup. ft. at 8d.	2	0
Per lineal foot	23	0

Or 11/6 per cube foot = cost price.

Cartage within one mile of depot, 5/– per ton.

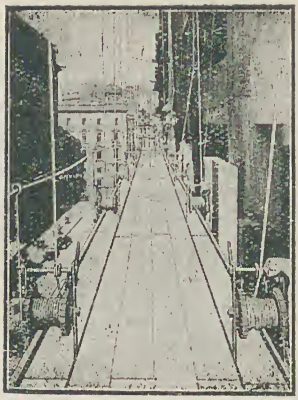
TRACHYTE.

Delivered on Rail or Steamer, from Bowral, N.S.W., Quarries.

	s.	d.
Footings an cube stones, quarry dressed, to 20 c. ft.; per c. ft. (*Large blocks as per arrangement.*)	6	0
Rough slabs for Coring, 3in. thick, per sq. ft.	2	6
Ditto do 9in. thick, per sq. ft.	3	9
Kerbing, 12in. x 18in., sawn face and edge, chamfered, square jointed, per lineal foot	8	6
Guttering, 18 x 6 do do do. ...	6	6
Paving Cubes, 9in. x 4in. x 6in., for cartways, per 100 ...	50	0
Flagging, sawn and squared, 3in. thick, per sq. ft.	7	6
Landings, up to 6in. x 20 sq. ft....	12	0
Steps, 12 x 6, sawn tread and riser, per sq. ft.	15	0
Girder Bearers, Corbels, and other dimensions stones, per cub. ft.	12	0
Labor, Polishing flat surfaces Trachite, exclusive of axing, per sq. ft.	7	6
Red and Grey Granite, in the rough, per cubic ft.	13	6

Labor on Trachyte, reckon 3 times for Sandstone.

Labor on Granite.—*See* page 28.



PATENT WINCHES FOR A SUSPENDED SCAFFOLD.

These are used for elevating a continuous platform for workmen when "facing" concrete constructions, and are hung with steel wire ropes from R.S. joists projecting at top of building.

Obtained on **Hire** per unit of 10ft.

First **unit** contains two winches to suspend a platform 5ft. wide. Double winches used for wide platforms up to 10ft.

Rental, 12/– per unit from agents, James Hardie & Co. Sydney and Melbourne.

GRANITE (HARCOURT).

On rail or wharf, Melbourne, per cube foot, up to 8ft. long—	s.	d.
Dimension stones, under 35 cube feet, each	3	6
Dimension stones, under 50 cube feet, each	3	11
Dimension stones, under 60 cube foot, each	4	4
Dimension stones, under 80 cube feet, each	5	0

Facing Stones for Concrete Buildings, 6 inches thick and upwards.

Patent axed work per foot cube, from 16/– repeat work.

Moulding, according to members, from 20/– per foot lin.

For further particulars, Loveridge & Hudson, Redfern, Sydney.

Sawing and Polishing, *Per foot super., each face.*	s.	d.
Sawing Oamaru (New Zealand) or Geelong freestone ...	0	10
Sawing Sydney or Spring Bay free sandstone	1	2
Marble, Italian, sawing or polishing each face	3	0
Black Marble ditto	5	0
Polishing Granite, Moruya, 6/–, and Harcourt	10	0
Sawing Malmsbury Bluestone	1	6

Polishing columns or other circular work add extra, as for circular stone cutting. The prices stated for polishing do not include the necessary dressing required to prepare for it.

Sandhurst Granite Columns, &c.

Polished Shafts, with swell. Per lin. foot. Sydney	s.	d.
Small size columns, per sup. ft.	90	0
Large size, ditto	80	0

Facing of Concrete Building.

Special Terracotta "Feance" work, 2 to 3 inches thick, panelled and cemented to face of Reinforced Concrete Buildings, cost plain worked facings, from 20/– per super. foot, according to quantity, and upwards.

For mouldings, breaks and openings according to design and finish details and manufacturers terracotta facings for concrete buildings, surface Granite, Cream, Rose Tinted or tooled and Stroke Imitation, for Quotations, *See advt., p.* 3

MARBLE MASON.

MARBLE.

There is such a richness and variety of colour, combined with soundness, in our Australian Marbles—qualities that commend themselves to the Architect and Builder—with the result that many of the principal Government and Private buildings, also vestibules of our principal theatres, are now tastefully faced and ornamented by their introduction. For localities where found, *see* under BUILDING MATERIAL OF STATES.

WHITE SICILIAN MARBLE.

Net trade price.

Slabs, polished face, square edges—¾in., 5/9; 1in., 7/8; 1¼in., 9/–.
Borenore, ditto, Rouge—¾in., 6/–; 1in., 8/–; 1¼in.. 10/–.
Ditto, Black (Molong)—¾in., 7/–; 1in., 9/–; 1¼in., 11/–.
Kalloola Marble, facing slabs—¾in., 7/6; 1in., 10/–; 1½in., 12/–.
Straw coloured streaked with gold.
Cudgegong Marble—¾in., 7/6; 1in., 10/–; 1½in., 12/–.
Grey Green Marble streaked with white, from ¾in., 8/–; 1in., 11/–; 1½in., 13/–. These three latter marbles were used in interior of entrance to Union House, and with good effect.
Steps and Nosing, rubbed smooth, under 7ft.—

Width.	1in.	1¼in.	1½in.	2in.	
12in. and over 9in. ...	7/–	7/9	8/6	11/–	per lin. ft.
¾ risers, to 6in. x ¾ ...		3/6 to 4/–			„

New Zealand Greenstone and Queensland White and Tinted Marble has a brittle and crystallised grain.

EXTRAS.

7ft. to 8ft., 4d.; 8ft. to 9ft., 8d.; 9ft. to 10ft., 1/6; per super. 1in. thick.
Slabs under 12in. and over 9in., reckoned 1ft. wide; under 9in., and over 6in., reckoned 9in. wide; under 6in. and over 3in., reckoned 6in. wide.
Moulding and Polishing—Labor:—
Fluted edge, 2/– to 3/6 per foot run.
2in. Moulding and Scotia, 4/– to 5/– per foot run.
Round nosed Edge, 1/– to 1/6 per foot run.
Rubbed Square Edge for Jointing, from 3d. to 5d. per lineal ft.

WEIGHTS PER TON.

Marble, ¾in., 222ft.; 1in., 167ft.; 1¼in., 133ft.; 1½in., 111ft.; 2in., 83ft.; 2½in., 66ft.
Slate, 1in., 150ft.; 1¼in., 120ft.; 1½in., 100ft.; 2in., 75ft.

Labor, Award Rates.

Marble or Slate Steps and Risers—
At day rates, **Marble or Slate** or other steps with tile risers to be paid for at the rate of 4d. per ft. run respectively.
Provided that all such steps and risers 4 feet long and under, should be paid at 1/4 for each step and 1/4 for each riser tiled.
All cutting done to be paid for at day rate.

BUILDING STONE AT ADELAIDE.

	s.	d.
Murray Bridge Limestone, a yellow limestone, hard and fine grain, 13 cub. ft. to ton. per cub. ft.	8	0
Tapley Hill Bluestone, a variegated brown stone (about 13 cub. ft. to ton), between a slate and a blue stone per ton, about a yard super, suitable for face work, per ton	24	0
Glen Osmond Bluestone Rubble, 14 cub. ft.	17	0
Wallunga Slate, per cub. ft.	8	0
Tarlee (a mudstone) **Shale slate**, 17 cub. ft. to ton, per ton ...	30	0
Victor Harbour Granite, per cub. ft.	7/– to 8/–	
Angaston Red Granite, on rail, per cub. ft.	8	0
Delivered to Adelaide, per cub. ft....	12	0
Harcourt Grey Granite, per cub. ft., from	11	0
Mintaro Slate, Melbourne, 1½in. thick to 15ft. super, from per super. ft.	3	0
Sydney Slate, Cookbundoon, 1½in. thick, under 7ft. long, per super. ft.	3	6
Labor, laying and jointing, 1½in. flags, per yard super...	3	0

LABOR INCLUDING BED.

Labor—Fixing Verandah Nosings, including bed, per 6ft., 3d. to 6d.
Ditto Steps and Risers, up to 4ft. long, per step, 2/– to 2/6.
Ditto Marble Mantels, including Plaster of Paris, each, from 5/–.
Laying Tiles—
Laying ¾in. Tiles, black or white, 12in. sq., laid in cement, 6/– sq. yd.
Ditto do. do. 8in. sq. do. 8/– sq. yd.
Facing Wall Work—
Ditto ¾in. **Facing** Walls, setting, including cement and pointing, from 4/– to 6/– sq. yd.
Ditto Fixing Dado Mouldings, 3in., per foot run, 3d.
Ditto Skirtings to bathrooms, 6in. x ¾in., per foot run, 2½d.
Copper Clamps, letting in and fixing, each, 1/3.
2 horse trolly load for city—
12 blocks of trachite, each 4ft. x 1ft. 6in. x 9in. thick.
Steam waggon load for city—
15 blocks of trachite, 4ft. x 1ft. 3in. x 12in.

TESTING NEW FUEL FOR MOTORS.

Extract from "Daily Guardian," Nov., 1926.

"This test was carried out with the usual motor machinery slightly altered if necessary to suit the gas produced, and all mixtures mentioned proved successful.

"**Cosmoline" liquid,** 60 per cent. of alcohol at 90 deg. with added 30 per cent. naphtholine oils and a 10 per cent. of a special solvent.

Compressed Acetylene to 75 per cent. of benzol and a certain proportion of heavy fuel gas oil, result 30 to 50 per cent. economy effected.

"**Ketol**" distilled wood pulp with alcohol."

STONE CARVING.

Labor only, each item.

Add 20 per cent. for roughing out by mason.

	£ s. d. Spring Bay Stone.	£ s. d. Sydney Stone	£ s. d. Oamaru Stone.
Ionic capital, Grecian or Roman for 6in. column (major diam.) ...	2 16 0	2 5 0	1 6 0
Ditto 9in. do. do.	3 17 0	3 5 0	1 17 0
Ditto 12in. do. do.	5 7 0	4 10 0	2 10 0
Ditto 18in. do. do.	7 0 0	6 5 0	3 10 0
Ditto 24in. do. do.	10 0 0	8 10 0	5 0 0
Ditto 30in. do. do.	12 0 0	9 15 0	6 0 0
For quarter pilasters one-half and for bases one-fourth the above.			
If enriched, add 20 per cent.			
Modillions, Ionic, or plain moulded, 3in. projection	0 4 6	0 3 9	0 2 3
Ditto 4½in. do., plain moulded ...	0 6 0	0 5 0	0 3 0
Ditto, 6in. do.	0 7 6	0 6 3	0 3 9
Cantilevers or trusses, 9in. do. do.	0 10 6	0 8 9	0 5 3
Ditto, 12in. do. do.	0 15 0	0 12 6	0 7 6
Corinthian or composite capital for 6in. (major diam.) column ...	4 10 0	3 15 0	2 5 0
9in. do. do. ...	7 10 0	6 5 0	3 15 0
12in. do. do. ...	12 0 0	10 0 0	6 0 0
18in. do. do. ...	16 0 0	14 0 0	8 0 0
14in. do. do. ...	20 0 0	17 0 0	10 0 0
30in. do. do. ...	24 0 0	21 0 0	12 0 0
For quarter pilasters one-half and for bases one-fourth the above.			
Paterae or rosette (rich), 4in. diam.	0 7 6	0 6 0	0 3 6
Ditto 6in. do. ...	0 9 0	0 7 6	0 4 9
Ditto 9in. do. ...	0 15 0	0 12 6	0 7 6
Centre flower (rich) 12in. do. ...	1 2 6	0 19 0	0 11 3
Ditto 18in. do. ...	1 17 6	1 12 0	0 18 9
Ditto 12in. do. ...	2 15 0	2 6 0	1 7 0
Mask or head, 4in.	0 9 0	0 7 6	0 4 6
Ditto 6in.	0 18 0	0 15 0	0 9 0
Ditto 9in.	1 4 0	1 0 0	0 12 0
Ditto 12in.	1 10 0	1 5 0	0 15 0
Ditto 15in.	1 17 0	1 11 0	0 18 0
Ditto 15in.	1 17 0	1 11 0	0 18 0

In carved work the stone is cubed in the rough; if prepared by the stone-cutter, the clean chiselling or boastering is reckoned by the super. foot, to which is added the cost of carving.

N.B.—In stone cutting the superficial measurement of girt is always taken, but when let at one price with the material, the length and breadth only are taken, and not the girt, for superficial measurement. Generally when the materials and labour are let together the same measurement is taken as for materials only.

	Spring Bay Stone.			Sydney Stone.			Oamaru Stone.		
	£	s.	d.	£	s.	d.	£	s.	d.
Acanthus leaf, 4in. long	0	6	0	0	5	0	0	3	0
Ditto 6in. do.	0	9	0	0	7	6	0	4	6
Ditto 9in. do.	0	12	0	0	10	0	0	6	0
Ditto 12in. do.	0	15	0	0	12	6	0	7	6
Lotus leaves, one-half the above.									
Oak or laurel wreath, 6in. diam.	0	15	0	0	12	6	0	7	6
Ditto do. 9in.	0	18	0	0	15	0	0	9	0
Ditto. do. 12in. do. ...	1	4	0	1	0	0	0	12	0
Oak leaf and corn frieze, with leaves 2in. long, per ft. sup.	1	7	0	1	2	6	0	13	6
Ditto do. 4in. do. do. ...	1	1	0	0	17	6	0	10	6
Panels sunk and moulded from 9 to 12in. square, and 1½ to 2in. deep rubbed	0	15	0	0	12	0	0	7	6
If undercut, add from 25 to 50 per cent.									

CARVING MOULDINGS.

Per foot run.

Egg and dart moulding, 1½in. girt	0	4	6	0	3	9	0	2	3
Ditto do. 2in. do.	0	5	3	0	4	6	0	2	8
Ditto do. 3in. do.	0	6	0	0	5	0	0	3	0
Ditto do. 4in. do.	0	6	9	0	5	9	0	3	5
Rope or cable moulding, 2in. do. ...	0	3	0	0	2	6	0	1	6
Ditto do. 3in. do.	0	4	6	0	3	9	0	2	3
Guillochis moulding, single, 3in. ...	0	6	0	0	5	0	0	3	0
Ditto, 4in. ditto	0	7	6	0	6	3	0	3	9
Ditto, 6in. ditto	0	9	0	0	7	6	0	4	6
Ditto, enriched, add 50 per cent.									

N.B.—The whole of the above items are presumed to be prepared by the stone-cutter as required, if not, add from 20 to 25 per cent. for preparing the stone or roughing out, and 8 per cent. for mortar and setting.

Stone Carving, which is generally fixed at a considerable height above the observer, does not require the degree of finish or delicacy of outline required in wood carving, which is generally fixed much nearer to the eye. In all ornamental work the time required to model or carve a given *Piece* depends materially upon the degree of finish, or *minutiae*, aimed at.

If any of the above items are required in Barrabool Hills, or South Australian freestone, the price will be about one-half that given for Spring Bay stone; for bluestone twice the price of Spring Bay stone; and for Adelaide marble or Moruya granite about thrice the cost of Spring Bay stone.

OIL-PULL TRACTOR (4 WHEELED) (*Light Weight*), 15-25 H.P. KEROSENE.

Motor Power, twin-cylinder, 5¾in. bore, 7in. stroke, **High Tension Magneto, Felt Pulley**, 16in. dia., 7½in. face, on crank shaft. **Carburettor triple heat control** of oil burning.

Three speeds, forward from 2 to 3 m.p.h., one reverse, high, price, £775.

Other sizes, 20-35 H.P., 30-60 H.P., which could haul a 12ft. **road grader.**

THE CLETRAC CATERPILLAR GRADER.

Extract from letter, Feb. 12th, 1923, W. L. Hunt, C.E., Shire Engineer to Byron Bay Shire Council, with reference to one of the above Tractors.

"The Cletrac Tractor has given every satisfaction in **haulage work of Shire**, and I now use it to **drive** a 12in. x 8in. **stone crusher,** the saving effected is astounding.

N.S.W. Govt. Ry. **Construction Werris Creek-Binnaway** branch. The superintendent says on every class of work, including **rooter ploughing, scooping, draining, stump pulling, carting, and power work** with the pulley the work was done with a **Cletrac** at a very much lower cost and quicker than any other method.

Victorian State Electricity Commission in 1922 used these machines for ploughing, ditching, **road scraping, post hauling, hoisting,** in addition to **belt work** in country, where wheeled vehicles could not move.

T. Colin A. Irvine, Road Contractor, Ouyen P.O., Mallee, N.S.W., June 22nd, 1923: "I have used it on ploughing 14in. deep single-furrow in heavy clay, also shifted with 6ft. scoop 1 cub. yard dirt each trip. Working costs averaging 4s. per chain of road for fuel, oil, grease, gear oil, and benzine for starting, for grubbing, ploughing, scooping and grading."

S.A. RAILWAYS ROSEWORTHY DAM CLEARANCE BY CLETRAC TRACTOR, 17th Feb., 1922.

H. Byrne, Secretary to Chas. Atkins & Co., Contractors, writes: "The dam measures 100 yards square x 15ft. deep, and has batters of 1 in 1½, 1 in 2, and 1 in 3 of hard sunbaked earth. Time occupied for removing 600 cub. yards of earth, 3 days of 24 hours. Part of this time was taken up in experimenting with **snatch-blocks** and **cable.** Under **this method** the Cletrac Tractor is hitched both back and front, and travels on the level ground in front of the silt removed, in all weathers and conditions, .17 cub. ft. wheel scoop and a Rooter Plough being used when working on the extreme edge of the dam, hauling. The Tractor was tilted to 45 degrees and worked with success."

Fuel Consumption—	£	s.	d.
Kerosene—24 gallons at 2/0½	2	9	0
Grease—2lbs. at 1/3	0	2	6
Petrol—½ gallon at 3/7	0	1	9½
Eng. Oil—¼ gallon at 6/6	0	1	7½
Differential Oil—½ gallon at 6/6	0	3	3
	2	18	2
Labor—Two men, three days, at 14/- per day ...	4	4	0
Cost 600 cub. yds., about 2⁵/₆d. per yard.	£7	2	2

Agents: Pacfiic Commercial Co., Pomeroy House, York St., Sydney.

MOTOR LORRIES FOR CONTRACTORS & MUNICIPAL WORK.

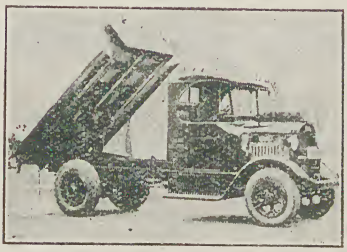
30/40 cwt. **light weight Chassis,** 1 ton 18 cwt. + 1 ton for 30 cwt. body, £720. Steel tip body extra, £140.

4 ton **Standard Lorry,** GH6 model, long wheel base.

Chassis, unloaded weight, 3 tons 6 cwt. 2 qrs. + body allowance, 25 cwt., price £1095.

Platform 16ft. 6in. x 7ft. **Driver's cab and windscreen,** price £74. Ditto 18ft. x 7ft., £90.

A nett load of 6 tons can be carried by substituting heavier springs, price £8 extra.



Electric Lighting Sets for Lorries, including dynamo, battery and lamps, from £65, fitted.

Acetylene Prest-o-lite tank, including 2 head lamps, from £13 12s.

2 wheel **Timber Jinkers,** including driver's cab and screen, to take up to 10 tons, from £312.

Steel Tip Body, 5 or 6 cub. yards, overtype hydraulic ram, with cab and screen, from £293.

Wood Tip Body, 3 cub. yards ditto, £160.

Diagram, see p. 118.

10- Ton Tractor Chassis, weight 3 ton 11 cwt.

COST OF RUNNING SPECIALISED.

4 ton **Leyland motor** wool from Darling Harbour Ry. Station to stores, up-grade, mostly on 80 miles per day basis, including wages, all charges, cost per ton mile, 3.1 pence ; with **trailer,** 2.5 pence.

The **former,** 6 ton loads, with **trailer,** 11 ton 2 cwt. (including a motor lorry complete).

4 ton **Lorry with Timber Jinker** will take loads up to 8 tons ; with **trailer,** will carry 3 tons silver ore, Camden and Burragorang Hills country.

Load of ¾ tons on 4 ton platform 15ft. x 7ft. lorry, approx. cost at 80 miles per day, loaded both ways, 2.8 pence per ton mile. With **trailer,** 2 pence per ton mile.

Street Sprinklers, 1,200 gal. tank, Newcastle and Sydney City Councils, will sprinkle 4¼ miles 60ft. wide spread in 30 minutes.

Side Tipping body with under type hyrdaulic rams for embankments, almost the same price as end tipping.

For further information, see advt., p. 4.

MOTOR LORRYS FOR CONTRACTORS AND MUNICIPAL COUNCILS.
TABLE OF APPROXIMATE WORKING COSTS UNDER NORMAL CONDITIONS.

(Leyland Motors Ltd.)—(*See Advt., p.* 4.)

THESE COSTS ARE BASED ON 250 DAYS TO YEAR, AND 5 DAYS TO WEEK, AND ARE APPROXIMATE ONLY. ACCORDING TO LOCAL CONDITIONS.

		5 Ton.			4 Ton.			3 Ton.			2 Ton.		
	Column No. ...	1	2	3	4	5	6	7	8	9	10	11	12
1	Miles per day ...	40	60	80	40	60	80	40	60	80	40	60	80
2	Cost of Chassis, with Platform ...		£1,257			£1,145			£918			£782	
3	Rubber Tyres, on 10,000 mile basis	£152	£228	£304	£118	£177	£236	£85	£127.5	£160	£82	£123	£164
4	Interest, 6% ...	£75.5	£75.5	£75.5	£69	£69	£69	£55	£55	£55	£47	£47	£47
5	Depreciation, 10%	£110	£110	£110	£102.5	£102.5	£102.5	£82.3	£82.3	£82.3	£70	£70	£70
6	Repairs per year	£45	£67.5	£90.5	£42.5	£63.5	£85.0	£40	£60	£80	£37.5	£56.5	£75.0
7	Drivers' Wages ...	£276	£276	£276	£266.5	£266.5	£266.5	£256	£256	£256	£246.0	£246.0	£246.0
8	Oils and Grease ...	£9	£10	£12	£9	£10	£11	£8	£9	£10	£7.5	£8.0	£8.5
9	Insurances	£31	£31	£31	£29	£29	£29	£25	£25	£25	£24.0	£24.0	£24.0
10	Petrol (2/– p. gall.)	£166.5	£250.0	£333.0	£144	£212.5	£287.5	£112.5	£166.5	£255.0	£100	£150	£200
11	Petrol Consumption, miles per gall. ...	6			7			9			10		
12	Motor Taxes ...	£25	£25	£25	£24	£24	£24	£20	£20	£20	£19	£19	£19
13	Total Yearly Cost	£890	£1073	£1257	£804.5	£954	£1110.5	£683.8	£801.3	£913.3	£633	£743.5	£853.5
14	Cost per Week ...	£17.8	£21.4	£25.1	£16.08	£19.08	£22.2	£13.6	£16.02	£18.2	£12.6	£14.8	£17.06
15	Cost per Day ...	£3.56	£4.28	£5.0	£3.2	£3.8	£4.4	£2.27	£3.20	£3.62	£2.52	£2.9	£3.4
		d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
16	Cost per Mile ...	21.4	17	15.0	19.2	15.2	12.8	16.2	12.8	10.8	15.1	11.6	10.2
17	Cost per Ton Mile, loaded both ways	d. 4.28	d. 3.4	d. 3.0	d. 4.8	d. 3.8	d. 3.2	d. 5.4	d. 4.2	d. 3.6	d. 7.5	d. 5.8	d. 5.1
18	Cost per Ton Mile, loaded one way	d. 7.71	d. 6.12	d. 5.4	d. 8.64	d. 6.84	d. 5.76	d. 9.72	d. 7.56	d. 6.48	d. 13.50	d. 10.44	d. 9.18

Top Speed 16 m.p.h. ; third speed 9.7 m.ph.. ; second 6.4 m.p.h. ; reverse speed 2.3 m.p.h.

By the courtesy of Leyland Motors Ltd. (England) Sydney Manager I have been enabled to give the approximate cost of timing.

PAINTER.

N.B.—In this as in all other cases where washes, fluids, or paint is applied, unless the timber is seasoned it will hasten its decay by retaining the pyroligneous acid found in all unseasoned timber. The following Australian timbers when dried or seasoned are said not to be molested by white ants, viz., the Jarrah and Turpentine. (*See* Index.)

In measuring painting, allow for all edgings, sinkings, or girths. In iron railing, and other open work, it is usual to take the two sides as flat work, and ornamental or small work twice for each side including Louvre blinds or lattice work.

Sashes and Frames should be measured as plain surfaces, including the glass and the exposed part of frames, with linings, &c., which should be girted; but if the squares exceed 3 super feet, then it is better to take the sash bars by the lineal yard.

MEMORANDUM.

White lead is the material for foundation of paint. **Linseed oil** is the vehicle and preservative, and forms a protective surface. To prevent blistering of this skin, boiled linseed oil is used in external work, and gives a glossy surface. The life of paint depends largely upon the quality of linseed oil used in the making.

Turps, the usual solvent, causes the paint to work freer and thinner and to cover more surface.

Driers causes skin to solidify by absorbing the oxygen.

Oxide of Iron paints are the best for covering iron or metal, as they combine chemically with particles of surface covered.

The first coat on plaster or cement should be primed with boiled oil. Flatting coats are mixed with turpentine only.

NOTES ON PAINTING.

A good even finish cannot be made of rough surface.

Two coat work is unsatisfactory.

Add more oil to paint on porous surfaces.

Do not thin paint with oil and driers to save labour, rub paint well into surface.

Add more turps for work to stand the sun and prevent blistering.

Clear white turps is better than yellow; also pale linseed oil is better than a greenish yellow.

Do not put too much oil in second coat.

Boiled oil will crack, but gives a better finish and gloss.

To soften and clean a hard set paint brush, make some turps hot In a fry-pan, and well rub and work brush in the boiling liquid.

TABLE SHOWING PRODUCTION OF TINTS BY MIXING.

Sky Blue—White and Prussian Blue.

Coral—White and Venetian Red.

Silver Grey—White and Black.

Buff—White, Orange, Chrome and Oxford Stone Ochre; or White, Yellow Chrome, and Oxford Ochre.

Azure Blue—White and Ultramarine.

Rough Rule for Ascertaining the Amount of Paint required to cover a desired surface.

Extract from "American Paint Co."

Example—House 20 x 40 x 30ft. high; 2 coat work.

Add the number of feet in width front and rear to the number of feet in length, both sides; multiply this with the average height; this divided by 300 will give the amount in gallons for two coats.

Thus 20 + 20 + 80 = 120 x 30 ft. high = 3600 ÷ 300 = 12 gallons.

No rule can be given for accurately determining the amount required, but the above is sufficiently correct for all practical purposes.

Should the surface be rough and porous, more paint will be required.

One gallon covers on good surface—1 coat, 35 sq. yards; 2 coats 25 sq. yards; 3 coats, 18 sq. yards.

MATERIAL REQUIRED TO COVER.

100 SQUARE YARDS WROUGHT FINE.

(From "American Painter's Reference.")

Inside Work.

Each coat.	Boiled Linseed Oil. Pints.	Raw Linseed Oil. Pints.	Turpentine. Pints.	Driers ozs.	White Lead. lbs.	Red Lead. lbs.
Priming ...	—	5	½	2	12	2
2nd coat	½	3	½	1½	10	
3rd coat. ...	½	3	½	1½	10	
4th coat ...		3	½	1½	10	
Flatting ...			2½	1½	8	
	1	14	4½	8	50	2
Outside Work	—					
Priming ...	2	2	½	2	16	
2nd coat	2	2	1	1¾	14	
3rd coat ...	2½	2½	¾	1½	13	
4th coat ...	2½	3	¼	1¼	12	
	9	9½	2½	6¾	55	2

AMOUNT OF PIGMENT ADDED TO 50lbs. WHITE LEAD, &c.

To form Colours.

White Paint	2lbs. Blue	Black (no lead)	50lbs. Lamp Blk.
Stone (Dark)	1lb. Bt. Umber	Green ,,	50lb. Verdigris..
Stone (Light)	½lb. ,,	Red Lead, 25; red ochre, 25lbs	
Lead Colour	1lb. Lamp Black	Chocolate—Lamp Blk, 2lbs., Span. Brn., 48lbs.	

PAINTERS' AND DECORATORS MATERIAL.

Prices subject to fluctuation.

Red Lead, 7d. per lb., or 56/– per cwt. (keg).
White Lead—Champion's, 80/– per cwt.; Fergusson's, 76/– per cwt.
Zinc White (English), 95/– per cwt.
Linseed Oil—Blundell & Spence, raw, 7/– per gal.; boiled, 7/3 per gal.
Linseed Oil—Meggitt's, raw, 6/–; boiled, 6/2.
Wood Preserving Oil, 10/– per 8 gal. case. Castor Oil, 7/3 per gal.
Lubricating, 3/6 per gal. Terebene, 10/6 per gal. Turps, 7/3 per gal.; "Drialine," 3/– per gal.
Sipes' Paint Oil, 80/– per case.
Knotty Composition, 14/6 per gal. Japan Gold Size, 12/6 per gal.
Naphtha, 2/6 per gal.; Methylated Spirits, 3/– per gal.
Putty, soft, 4½d. per lb.; per cwt., 25/6.
Zinc Powder, 50/– per cwt.
Pumice Stone, 6d. per lb.; Caustic Soda, 68/– per cwt. Potash, 9d. per lb.
Shellac, 3/3 per lb. French Polish, 12/6 per gal.; Brunswick Black, 8/– per gal.
Ready Mixed Paints, per lb., in tins, from 9d.
Hessian & Scrim rolls of 50 yrds., 10½d. per yard.
Colouring Materials, per lb.—
Long black, 6d.; Drop Black, 1/6; Vegetable Black, 2/–.
Raw and Burnt Sienna in Oil, 10d. to 1/8; Venetian Red, 2½d.; Red Raddle, 6d.; India Red, 9d.; Chinese Red, 2/6.
Burnt and Raw Umber, 10d.; Purple Brown, 9d.; Yellow Ochre, 2½d. to 5d.
Aluminium Enamel, per pint tin, 3/6. Aluminium Bronze, per lb., 5/– to 10/–; Aluminium Leaf, per book, 6d.
Gold Leaf, per book, 2/3; Silver Leaf, per book, 1/6.
Docker's Varnish Stains, per quart, 4/6.
Best **Copal Varnish** exterior use, 14/6; interior use, 13/6; for wall paper, per gal., 18/6.
Oak Varnish, per gal., 9/– to 11/–.
Black Japan Varnish, for mantels, per gal., 14/6.
Enamelling and Finishing Paints—
Enamelac Bergers, per gal.
Velure, flat or gloss enamel, from 53/– per gal.
Bon-Accord, 30/– per gal.
Repolin Paint, enamel or flat, from 57/6 per gal.
Berger's Mixed Paints, 27/– per gal.
Rickshaw pure liquid high-class paint, 27/6 per gal. *See advt.*, p. 22.
Meggitt's Linseed Oil, 5/7 per gal. *See advt.*, p. 33.
For further information, pp. 2, 33.
"Rok" Cold Cement Paint, 13/3 per gal.
"Sidol" Wood Preservative, reputed good, 11/6 to 14/– per gal. One gal will cover 33 square yards.
Rokolor Paint, for Bituminous Roofings, in 3 colours, 12/6 per gal.
Siderosthen anti-corosive paint, for iron bridge work, shutes, girders, water and gas mains, buoys and guttering.

7 Colours, Price £5 to £6 per cwt. Covering capacity, 400 square yards. Black, 11 gals.; Chocolate, 10 gals. per cwt. Other colours, 4 to 5 gal per cwt. *See Advt., p.* 13.

Graphilatum roof paint, 16/– per gal. Special hot surface paint, 22/–.

Cement liquid, white roof paint, 14/6; red or green, 22/6.

Dry Coat, a Plaster bond, 19/–; Resisto Varnish, 35/–.

Long Life Structural Iron Paint, 32/–; L.L. Concrete Floor Coating, 38/–.

Liquid Metalcrete, a concrete hardener, 13/–.

Metalcrete Concrete Hardener, 10d. per lb., in 100lb. kegs.

Metalcrete Crystals, 5/6 per lb., 2 lbs. per gal.

Sanalifte Gloss, an enamels paint, 38/– per gal.

Pablo Hydroseal, a water proofing plastic, black, 8/6; white, 22/–.

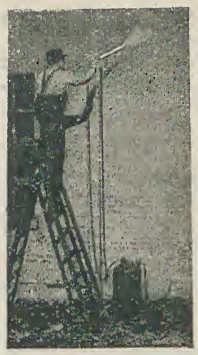
Pablo Floatoid, for painting old roofs, black, 8/9; maroon, 12/3 per gal.

Certainteed Asbestos Roofing Compound, thick and black, for repairing leaky and worn out gal. iron roofs or roof guttering. Applied to surfaces when dry, it hardens and is effective, 9/6 per gal. For covering roofs of concrete base, or boarded.

Paint, to cover one coat, 100 square yards on average woods.
15lb. White Lead.
½ gal. of Linseed Oil.
¼ gal. Turps.
¼ lb. Dryers.
Reckon Sandpaper, wear and tear on brushes, and putty.

DISTEMPER AND COLOURINGS—MATERIAL ONLY.

	£	s.	d.
Arabic, a dry mineral powder for colouring gal. iron roofs and outside walls; mixed with water. White. Said to prevent rust on iron, and does not contaminate rain water. 28lb. packet covers 75 sq. yards on galvd. iron			
Duresco, for decorative colouring and stippling, per cwt. ...	4	4	0
Kalsomine, Johnston's, for interior decoration, to mix with hot water, 5lb. packets. Colours, per packet	0	3	0
"**Medusa**" white or tinted, 68/–; in 3 cwt. lots, water proofing	3	10	0
Millwhite, a finely ground Kaolin production. Can be used with oil and turps, but has a petrifying liquid as a fixer preparation.			
Valspar Varnish, a washable covering for bath rooms, ½ gal. cans, floor, walls.			
Hodges, Pat. Cold Water Kalsomine, 17 tints, 5lb. packets...	0	2	0
Oxydised Paint can be used with a spray, 6d. per lb., mixed. **Indelible.**—A cold water paint, can be washed with hot soap and water, or scrubbed, per 5lb. packet	0	3	0
Pulverite, per gal.	0	10	6
Hall's Distemper, 70 tints, sanitary, cold water paint, washable; 11b. will cover 45 yards; per 7lb. tin	0	4	6



By Compressed Air, applying Paint to Wall.

Automatic Spray Machines, for large surfaces. Have been used with success. Acetylene gas. 4 gal. capacity 9 10 0

There are several kinds, from the simple bucket syringe, 45/–, to the hand force pump description. Acetylene gas is also used as a generator of force required.

Compressed Air Spray Gun, for distributing fine lacquer ... 12 10 0

Lacquers for front doors, to withstand heat and weather, or motor cars. In 5 gal. drums, 50/–. Charges, Black, 22/–; Thinners 1 1 0

" Keystone " flat finish, 27/6 per gal. ; preparatory liquid, 12/6 per gal.

No. 232 R.I.W. damp resisting paint, 17/6 per U.S. gal. for application to inside of brick walls as a damp-proof resister.

Deodoriser Spray Disinfectant, good and pleasant. For public Urinals. Nightingale Supply Co., 10 Mary St., Sydney (Oxford St.).

Crane's Nitro-Lac, for use with Spray Gun. Industrial Lacquers, specialily for front doors. Used extensively throughout large buildings, or exposed surfaces. Will not peel or blister with the sun and weather like paint.

See advt., p. 2.

Apply **Anti-Bor-Ant** with spray or brush to all surfaces of timber before using same in infested localities to render it immune to borer or white ant. If infested, apply with fine syringe through borer hole. 16oz. bottles, 3/3 ; ¼ gal. tins, 6/– ; ½ gal. tins, 10/– ; 4 gal., 70/–.

See Advt., p. 35.

Timbrol, a wood preservative, in 4 gal. tins, 6/– per gal.

" Kerotin " Spray Pump, with hose and single spray, 26/6. For thin whiting, spraying, &c.

See Advt., p. 10.

Artisoil, a disinfectant and brown stain, 2/6 and 3/– per gal.

Silacene, for furnace repair work. A **substitute** for fire brick in action, to resist heat.

See Advt., pp. 2, 10, 33.

De Oelbiss Spray Equipment. Portable Outfits from £95 upwards. Stationary Outfits, from £50 upwards.

This machine governs the sprayed liquid to a line almost. Excelsior Supply Co., 160 George St. West, Sydney.

Robbialac, all colours, British make. Can be applied with brush for front doors, exposed surfaces, or motor cars, etc., 26/– per gal.

Toch Bros.' "Liquid Konkorit," in 7 colours, grey to chocolate, for damp-proofing cement, concrete, brick, 25/– U.S. gal. 1 gal. covers 150 sq. yds. *See* agents, page 22.

Carter's Damp-proof Wall Composition, 10/6 per gal.

B. & P. Damp Resister, 10/6 per gal.

TO MAKE WALLS WATERPROOF.

Sylvester's Process.—Castile Soap and Alum Coats.

First Coat.—Mix ¾lb Castile Soap to one gallon of water; apply with brush, allow 24 hours to dry, then apply

Second Coat.—Viz, mix ¼lb. alum to 4 gal. water; after 24 hours repeat the coats. A chemical glaze is formed which is said to be impervious for years.

PATENT PAINTS.

Ferrodor Paint is a preservative paint for steel, iron, or timber. It is said to be superior to oxide of iron or red lead, as it will not crack or peel off. 1 cwt. covers when mixed, 713 sq. yards, and a gallon weighs 18½lbs. Red lead covers 377 sq. yards, and a gallon weighs 36½lbs. To thin the paint add 30lbs. pure boiled Linseed Oil to 1 cwt. of paste. About 100/– per cwt.

	£	s.	d.
Jodelite, for preventing fungus and dry rot, white ant and teredo navalis, or sea worm; also for preserving wood paving, wharf piles, bridge beams, fencing posts, &c.; rats will not touch woodwork treated by it. *See advt.*, *p.* 7. Price, 1 gal., 5/–; 5 gallons	1	2	6
"**Antabane**," for white ants, dry rot, &c., per gal.	0	3	6
Szerelaney, a stone liquid, waterproof and paste, ground in oil	1	0	0
Petrifying Liquid, colourless wash for hardening and waterproofing stone, brick, or cement work. For agent, *see advt.*, *p.* 22. 12 gallons to cwt., per gal....	0	12	6
Bitumene Solution, 10 gallons = 1 cwt., said to cover 45 sq. ft. per gal.	0	7	6
B. & P. Paints and Compounds, all colours, and for different purposes, per gal., from	0	6	0
Creosote, for preserving wood, per gal. *See advt.*, *p.* 23 ...	0	3	6

DEE'S RUST PREVENTER.

For coating Steel, Iron, and other Metals.

Preserves colouring, if painted work; keeps polished surfaces bright. One gallon said to cover 600 sq. ft. rough work, 1000 sq. ft. smooth.

Treating Fibrous Cement and Concrete Surfaces.

Fibrous Plaster or **Fibrous Cement.**—First coat silicate of soda, 10 parts to 1 water after the material is thoroughly dry.

Economical method of treating fresh concrete before painting to neutralise the alkalies of the cement.—Mix equal parts in weight of zinc sulphate and water; this mixture changes the caustic lime to calcium sulphate or gypsum.

PAINTING AND GENERAL SUMMARY (Knotting not included).
Labour at 2/6 and Material, per sup. yard.

Covering Plain Surfaces of Wrought Wood, Iron, in common colours, such as lead, stone, white, black, brown, chocolate, &c., including knotting and stopping.

	Each coat. s. d.
Painting and Stopping (large surfaces) on weather boarding, &c., 2 coats	1 8
Ditto do. do. do. 3 coats	2 4
Ditto do. do. do. 4 coats	2 8
Ditto do. do. do. 3 coats and flatted ...	3 0
Varnishing, 2 coats, ordinary, and sizing, 2/2 ; best varnish ...	3 0
Running, ¼ to 1½ lines, any colour, per ft. run	0 4
Ditto do. do. in Duresco, per ft. run ...	0 3
French Polishing, handrails, per ft. run	1 0
Fine Distemper Kalsomining, Alabastion, Arabic, per yard ...	0 6
Duresco, or similar finishing, coat stippled, per yard	1 2
Distemper, ordinary, any tint	0 6
Lime Washing, per coat	0 3
Wood Preserving Oil, at 1/6 per gal. ; per coat, per yard... ...	0 1
Cleaning down and rubbing off old work, per yard ... 6d. to	0 9
Burning off and preparing old work, per yard	1 6
Ditto and sizing in one coat	0 7
Staining, sizing, varnishing, 1 coat	2 3
Ditto, varnishing, 2 coats	2 8

Work executed off ladders, add 10 per cent.
Close Picket Fencing, reckon 50 per cent. on plain work.
Close Lattice Work, reckon double measurement.

If wages or materials alter in price, reckon by percentage.

VARNISHING.

Varnish, 18/– per gal.	Materials. s. d.	Labor. s. d.
Spirit varnish, each coat, per yard	0 9	0 4
Varnishing once in best copal, per yard	0 11½	0 4
Ditto, twice do.	1 2	0 8
For every additional coat, add	0 7	0 4

FRENCH POLISHING.

French Polishing, per foot super	0 1½	0 10
Ditto to columns fluted, per foot super	0 2½	0 2
Ditto, to handrails and small articles, per ft. run ...	0 1½	1 0
Polish, per gallon	12 6	

Before varnishing the pores of the wood are filled with white size. For superior work after sizing the surface is either sand-papered or rubbed over with pulverised pumice-stone, which gives an even face and fills up the pores of the wood. The best French polish is mixed and rubbed in with finely powdered pumice stone.

GRAINING, &c.	Complete.
Per yard super.	s. d.
Plain Oak, combed and shadowed, from	3 0
Satin wood, coromandel, rosewood, bird's eye, maple, pollard oak, or Huon pine	3/6 to 5 0
Fancy Veined Marbling, including white ground ...	4/- to 9 0

WRITING COMPLETE.

Per letter per inch in height.	s. d.
Plain painted letters, 1 to 4in.	0 2
Ditto 4 to 8in. high	0 1½
Ditto 8in. and over	0 1
Egyptian or sunk letters	0 4
Gold, plain or bronze, with gilt edges or colour	0 8
If shaded, add 1d., if double shaded	0 2
Writing on glass, plain burnished gold, with two shades, on coloured ground	0 10
Ditto, with three shades, ditto	1 2
Embossing and gilding ornamental letters with two shades on coloured ground	2 8

For German text, old English, ornamental or ancient writing, add 50 per cent. to the above.

RECIPES.

Japan Black for Leather.—Burnt umber, 4ozs.; true asphaltum, 2ozs.; boiled oil, 2 quarts. Dissolve the asphaltum by heat in a little of the oil, add the burnt umber (ground in oil) and the remainder of the oil; mix, cool, and thin with turpentine.

Mahogany Varnish.—Gun amm., 8lbs.; clarified oil, 3 gal.; litharge and powdered dry sugar of lead, of each ¼lb. Proceed as for body varnishes, and thin with oil of turpentine, 5 gal., or a sufficient quantity.

Turpentine Varnish.—Put 1 pint of turpentine into a bottle with 1½lbs. of white resin in powder. Dissolve in a gentle heat by placing the bottle in an iron pot surrounded by dry sand over a moderate fire.

A Cheap Oak Varnish.—2 quarts of boiled oil, 1½lbs. of litharge, ¾lb. gum shellac. All boiled together and stirred up till dissolved, then take off the fire and add 2 quarts of turps; when settled strain into a bottle and cork up for use.

Glass Cement Recipe, adhesive for glass or platter.—India rubber dissolved in gum mastic and glue, add half gelatine and isinglass. Melt together and thin with spirits.

Plain for Rough Woodwork.—6lbs. melted pitch, 1lb. linseed oil, and 1lb. yellow ochre.

How to Kill Grease Spots.—Before painting wash over smoky or greasy parts with saltpetre or very thin line whitewash; if soapsuds are used they must be washed off thoroughly as they prevent the paint from drying.

To Cover Fibro Cement with a cold water paint add petrifying liquid with each coat.

Table of Oil Measure.

At 9 lbs. to the gallon.

Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per. cwt £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.
0	18	2	1	5½	1	7	6	2	2½	1	17	4	3	0	2	6	8	3	9
0	18	8	1	6	1	8	0	2	3	1	17	10	3	0½	2	7	2	3	9
0	19	2	1	6½	1	8	6	2	3½	1	18	4¼	3	1	2	7	8¼	3	10½
0	19	8¼	1	7	1	9	0¼	2	4	1	18	10½	3	1½	2	8	2½	3	10½
1	0	2½	1	7½	1	9	6½	2	4½	1	19	4¾	2	2	2	8	8¾	3	11
1	0	8¾	1	8	1	10	0¾	2	5	1	19	11	3	2½	2	9	3	3	11½
1	1	3	1	8½	1	10	7	2	5½	2	0	5¼	3	3	2	9	9¼	4	0
1	1	9¼	1	9	1	11	1¼	2	6	2	0	11½	3	3½	2	10	3½	4	0½
2	2	3½	1	9½	1	11	7½	2	6½	2	1	5¾	3	4	2	10	9¾	4	1
2	2	9¾	1	10	1	12	1¾	2	7	2	2	0	3	4½	2	11	4	4	1½
1	3	4	1	10½	1	12	8	2	7½	2	2	6¼	3	5	2	11	10¼	4	2
1	3	10¼	1	11	1	13	2¼	2	8	2	3	0½	3	5½	2	12	4½	4	2½
1	4	4½	1	11½	1	12	8½	2	8½	2	3	6¾	3	6	2	12	10¾	4	3
1	4	10¾	2	0	1	14	2¾	2	9	2	4	1	3	6½	2	13	5	4	3½
1	5	5	2	0½	1	14	9	2	9½	2	4	7¼	3	7	2	13	11¼	4	4
1	5	11¼	2	1	1	15	3¼	2	10	2	5	1½	3	7½	2	14	5½	3	4½
1	6	5½	2	1½	1	15	9½	2	10½	2	5	7¾	3	8	2	14	11¾	4	5
1	6	11¾	2	2	1	16	3¾	2	11	2	6	2	3	8½	2	15	6	4	5½

A Table of Turpentine Measure.

8lbs. 10ozs. to the gallon.

Per cwt. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	Per gal. s.	d.	Per cwr. £	s.	d.	Per gal. s.	d.	Per cwt. £	s.	d.	s.	Per gal. d.
1	6	0	2	0	1	16	0	2	9	2	6	0	3	6	2	16	0	4	4
1	7	0	2	1	1	17	0	2	10	2	7	0	3	7	2	17	0	4	4½
1	8	0	2	2	1	18	0	2	11	2	8	0	3	8	2	18	0	4	5½
1	9	0	2	2½	1	19	0	3	0	2	9	0	3	9	2	19	0	4	6½
1	10	0	2	3½	2	0	0	3	1	2	10	0	3	10	3	0	0	4	7
1	11	0	2	4½	2	1	0	3	2	2	11	0	3	11	3	1	0	0	8
1	12	0	2	5½	2	2	0	3	3	2	12	0	4	0	3	2	0	4	9
1	13	0	2	6½	2	3	0	3	3½	2	13	0	4	1	3	3	0	4	10
1	14	0	2	7½	2	4	0	3	4½	2	14	0	4	2	3	4	0	4	11
1	15	0	2	8	2	5	0	3	5	2	15	0	4	3	3	5	0	5	0

DURABLE WHITEWASH.

(American Congress Recipe.)

Used on "White House," Washington.

Slack ½ bushel of unslacked lime with boiling water, covered to keep in steam. Strain through fine sieve. Add a peck of salt previously dissolved in warm water; 3lbs. ground rice, boiled to a thin consistency; ½lb. powdered whiting; 1lb. of clean glue, previously dissolved. Boil the mixture for an hour in a small kettle inside another.

Then add 5 gals. of hot water, stir it well, stand for a few days, and put on hot with fine or coarse brush, according to finish required. It remains brilliant for many years. Colouring matter may be added if desired. 1 pint covers 1 yard.

SUNDRIES.

Tarring.—One gallon of tar with 1lb. pitch will cover one square, or 11 super yards.

Caulking.—1 cwt. of oakum will do 700 lineal feet of seams in 2½in. planking, but on good work, with fine seams, half this quantity will suffice.

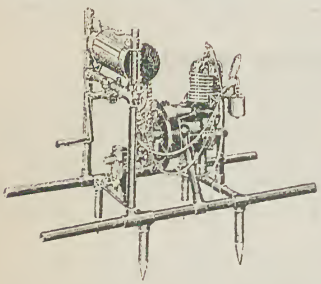
Chunam.—1 bushel fine sifted lime and 2 gallons best thin black oil, well mixed together, will be found a cheap and effectual substitute for white lead in T. & G. flooring for verandahs, &c.

To prevert the paint or galvanised iron from flaking dissolve copper chloride, copper nitrate ,and sal ammoniac, ½oz. each; when dissolved add ½oz. hydrochloric acid to 1 gal. of water.

Methods of Colouring Copper by oxidising the surface.—Make a paste of iron oxide and Graphite with wood alcohol; heat in oven; the colour obtained will depend on the amount of iron oxide mixed and the time of heating; protect the colour obtained with varnish or lacquer.

Brown colours are obtained by using a mixture of verdigris, sal ammoniac, 2 to 3 pints to 1 of vinegar; heat in oven.

Blue-black and **Blue-grey** colours may be given to copper by dipping in hot "liver of sulphur" solution and thoroughly dipping or scratch brushing, again dipping and washing.



The "New Moon" Pumping or Spraying Plant. Weight 70lbs. Price £48 net. Engine 1 h.p., rear pump. Length 3ft. 6in., width 1ft. 3in., height, 2ft. 6in.

Larke Parkes Ltd., Manufacturers, 27-39 Foveaux St., Sydney.

TABLES (Overleaf.)

For Plasterers, Painters, Paper-Hangers, Tuck-Pointers, and Surfacers of every Description.

Table showing number of square yards of wall surface in rooms of various sizes, *including* square yards of ceiling for same.

If *through* halls or passages are taken, deduct twice width by height, divide by 9 for yards, and deduct from table.

If *walls* alone are required, multiply the length and breadth of wall taken, divide by 9 for yards, and deduct from table.

DIRECTION TO USE TABLE.

EXAMPLE.—Say room 19ft. x 13ft. x 7ft. high to ceiling or plate rail. Take 19 (in 7ft. high table) and follow along 13 line to junction, read 77.2 sq. yds., viz., total number of square yards on walls without openings deducted, together with a 19ft. x 13ft. ceiling. Multiply together — 247 ÷ 9 — 27.4, which deduct from 77.2 — 49.10 sq. yds. for walls alone.

FOR PLASTERERS, PAINTERS, PAPER-HANGERS, TUCK-POINTERS AND SURFACERS OF EVERY DESCRIPTION.

Table showing number of square yards of wall surface in rooms of various sizes, *including* square yards of ceiling for same.

Square Yards and Feet of Walls in Rooms of various sizes 7-foot High, including Sq. Yards in Ceilings.

Size in feet	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3.....	10.3	12.2	14.1	16.0	17.8	19.7	21.6	23.5	25.4	27.3	29.2	31.1	33.0	34.8	36.7	38.6	40.5	42.4	44.3	46.2
4.....	12.2	14.2	16.2	18.2	20.2	22.2	24.2	26.2	28.2	30.2	32.2	34.2	36.2	38.2	40.2	42.2	44.2	46.2	48.2	50.2
5.....	14.1	16.2	18.3	20.4	22.5	24.6	26.7	28.8	31.0	33.1	35.2	37.3	39.4	41.5	43.6	45.7	47.8	50.0	52.1	54.2
6.....	16.0	18.2	20.4	22.6	24.8	27.1	29.3	31.5	33.7	36.0	38.2	40.4	42.6	44.8	47.1	49.3	51.5	53.7	55.8	58.2
7.....	17.8	20.2	22.5	24.8	27.2	29.5	31.8	34.2	36.5	38.8	41.2	43.5	45.8	48.2	50.5	52.8	55.2	57.5	59.8	62.2
8.....	19.7	22.2	24.6	27.1	29.5	32.0	34.4	36.8	39.3	41.7	44.2	46.6	49.1	51.5	54.0	56.4	58.8	61.3	63.7	66.2
9.....	21.6	24.2	26.7	29.3	31.8	34.4	37.0	39.5	42.1	44.6	47.2	49.7	52.3	54.8	57.4	60.0	62.5	65.1	67.6	70.2
10.....	23.5	26.2	28.8	31.5	34.2	36.8	39.5	42.2	44.8	47.5	50.2	52.8	55.5	58.2	60.8	63.5	66.2	68.8	71.5	74.2
11.....	25.4	28.2	31.0	33.7	36.5	39.3	42.1	44.8	47.6	50.4	53.2	56.0	58.7	61.5	64.3	67.1	69.8	72.6	75.4	78.2
12.....	27.3	30.2	33.1	36.0	38.8	41.7	44.6	47.5	50.4	53.3	56.2	59.1	62.0	64.8	67.7	70.6	73.5	76.4	79.3	82.2
13.....	29.2	32.2	35.2	38.2	41.2	44.2	47.2	50.2	53.2	56.2	59.2	62.2	65.2	68.2	71.2	74.2	77.2	80.2	83.2	86.2
14.....	31.1	34.2	37.3	40.4	43.5	46.6	49.7	52.8	56.0	59.1	62.2	65.3	68.4	71.5	74.6	77.7	80.8	84.0	87.1	90.2
15.....	33.0	36.2	39.4	42.6	45.8	49.1	52.3	55.5	58.7	62.0	65.2	68.4	71.6	74.8	78.1	81.3	84.5	87.7	91.0	94.2
16.....	34.8	38.2	41.5	44.8	48.2	51.5	54.8	58.2	61.5	64.8	68.2	71.5	74.8	78.2	81.5	84.8	88.2	91.5	94.8	98.2
17.....	36.7	40.2	43.6	47.1	50.5	54.0	57.4	60.8	64.3	67.7	71.2	74.6	78.1	81.5	85.5	88.4	91.8	95.3	98.7	102.2
18.....	38.6	42.2	45.7	49.3	52.8	56.4	60.0	63.5	67.1	70.6	74.2	77.7	81.3	84.8	88.4	92.0	95.5	99.1	102.6	106.2
19.....	40.5	44.2	47.8	51.5	55.2	58.8	62.5	66.2	69.8	73.5	77.2	80.8	84.5	88.2	91.8	95.5	99.2	102.8	106.5	110.2
20.....	42.4	46.2	50.0	53.7	57.5	61.2	65.1	68.8	72.6	76.4	80.2	84.0	87.7	91.5	95.3	99.1	102.8	106.6	110.4	114.0

Side Walls and includes Ceilings.

Directions to Use Table :—Example.—Say room 19ft. x 13ft. x 7ft. high to ceiling or plate rail. Take 19 (in 7ft. hight able) and follow along 13 line to junction, read 77.2 sq. yds., viz., total number of square yards on walls without, openings deducted, together with a 19ft. x 13ft. ceiling. Multiply together — 247 ÷ 9 — 27.4, which deduct from 77.2 — 49.10 sq. yards for walls alone.

Square Yards and Feet of walls in Rooms 8-foot high including Sq. Yards in Ceilings.

Size in feet	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3.....	11.6	13.7	15.8	18.0	20.1	22.2	24.3	26.4	28.5	30.6	32.7	34.8	37.0	39.1	41.2	43.3	45.4	47.4	49.6	51.7
4.....	13.7	16.0	18.2	20.4	22.6	24.8	27.1	29.3	31.5	33.7	36.0	38.2	40.4	42.6	44.8	47.1	49.3	51.5	53.7	56.0
5.....	15.8	18.2	20.5	22.8	25.2	27.5	29.8	32.2	34.5	36.8	39.2	41.5	43.8	46.2	48.5	50.8	53.2	55.5	57.8	60.2
6.....	18.0	20.4	22.8	25.3	27.7	30.2	32.6	35.1	37.5	40.0	42.4	44.8	47.3	49.7	52.2	54.6	57.1	59.5	62.0	64.4
7.....	20.1	22.6	25.2	27.7	30.3	32.8	35.4	38.0	40.5	43.1	45.6	48.2	50.7	53.3	55.8	58.4	61.0	63.5	66.1	68.9
8.....	22.2	24.8	27.5	30.2	32.8	35.5	38.2	40.8	43.5	46.2	48.8	51.5	54.2	56.8	59.5	62.2	64.8	67.5	70.2	72.8
9.....	24.3	27.1	29.8	32.6	35.4	38.2	41.0	43.7	46.5	49.3	52.1	54.8	57.6	60.4	63.2	66.0	68.7	71.5	74.3	77.1
10.....	26.4	29.3	32.2	35.1	38.0	40.8	43.7	46.6	49.5	52.4	55.3	58.2	61.1	64.0	66.8	69.7	72.6	75.5	78.4	81.3
11.....	28.5	31.5	34.5	37.5	40.5	43.5	46.5	49.5	52.5	55.5	58.5	61.5	64.5	67.5	70.5	73.5	76.5	79.5	82.5	85.5
12.....	30.6	33.7	36.8	40.0	43.1	46.2	49.3	52.4	55.5	58.6	61.7	64.8	68.0	71.1	74.2	77.3	80.4	83.5	86.6	89.7
13.....	32.7	36.0	39.2	42.4	45.6	48.8	52.1	55.3	58.5	61.7	65.0	68.2	71.4	73.6	77.8	81.1	84.3	87.5	90.7	94.0
14.....	34.8	38.2	41.5	44.8	48.2	51.5	54.8	58.2	61.5	64.8	68.2	71.5	74.8	78.2	81.5	84.8	88.2	91.5	94.8	98.2
15.....	37.0	40.4	43.8	47.3	50.7	54.2	57.6	61.1	64.5	68.0	71.4	74.8	78.3	81.7	85.2	88.6	92.1	95.5	99.0	102.4
16.....	39.1	42.6	46.2	49.7	53.3	56.8	60.4	64.0	67.5	71.1	74.6	78.2	81.7	85.3	88.8	92.4	96.0	99.5	103.1	106.6
17.....	41.2	44.8	48.5	52.5	55.8	59.5	63.2	66.8	70.5	74.2	77.8	81.5	85.2	88.8	92.5	96.2	99.8	103.5	107.2	110.8
18.....	43.3	47.1	50.8	54.6	58.4	62.2	66.0	69.7	73.5	77.3	81.1	84.8	88.6	92.4	96.2	100.0	103.7	107.5	111.3	115.1
19.....	45.4	49.3	53.2	57.1	61.0	64.8	68.7	72.6	76.5	80.4	84.3	88.2	92.1	96.0	99.8	103.7	107.6	111.5	115.4	119.3
20.....	47.5	51.5	55.5	59.5	63.5	67.5	71.5	75.5	79.5	83.5	87.5	91.5	95.5	99.5	103.5	107.5	111.5	115.4	119.5	123.5
21.....	49.6	53.7	57.8	62.0	66.1	70.2	74.3	78.4	82.5	86.6	90.7	94.8	99.0	103.1	107.2	111.3	115.4	119.5	123.6	127.7
22.....	51.7	56.0	60.2	64.4	68.8	72.8	77.1	81.3	85.5	89.7	94.0	98.2	102.4	106.6	110.8	115.1	119.3	123.5	127.7	132.0
23.....	53.8	58.2	62.5	66.8	71.2	75.5	79.8	84.2	88.5	92.8	97.2	110.5	105.8	110.2	114.5	118.8	123.2	127.5	131.8	136.2
24.....	56.0	60.4	64.8	69.3	73.7	78.2	82.6	87.1	91.5	96.0	100.4	104.8	109.3	113.7	118.2	122.6	127.1	131.5	136.0	140.4

Multiply or Deduct Area of Ceilings if Walls only are required.

Sizes and Square Yards and Feet of Walls in Rooms 9-foot high, including Ceilings.

Size	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3 ...	13.0	15.3	17.6	20.0	22.3	24.6	27.0	29.3	31.6	34.0	36.3	38.6	41.0	43.3	45.6	48.0	50.3	52.6	55.0	57.3
4 ...	15.3	17.7	20.2	22.6	25.1	27.5	30.0	32.4	34.8	37.3	39.7	42.2	44.6	47.1	49.5	52.0	54.4	56.8	59.3	61.7
5 ...	17.6	20.2	22.7	25.3	27.8	30.4	33.0	35.5	38.1	40.6	43.2	45.7	48.3	50.8	53.4	56.0	58.5	61.1	63.6	66.2
6 ...	20.0	22.6	25.3	28.0	30.6	33.3	36.0	38.6	41.3	44.0	46.6	49.3	52.0	54.6	57.3	60.0	63.5	65.4	68.0	70.6
7 ...	22.3	25.1	27.8	30.6	33.4	36.2	39.0	41.7	44.5	47.3	50.1	52.8	55.6	58.4	61.2	64.0	66.7	69.5	72.3	75.5
8 ...	24.6	27.5	30.4	33.3	36.2	39.1	42.0	44.8	47.7	50.6	53.5	56.4	59.3	62.2	65.1	68.0	70.8	73.7	77.6	79.1
9 ...	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0	51.0	54.0	57.0	60.0	63.0	66.0	69.0	72.0	75.0	78.0	81.0	84.0
10 ...	29.3	32.4	35.5	38.6	41.7	44.8	48.0	52.0	54.2	57.3	60.4	63.5	66.6	69.7	72.8	76.0	79.1	82.2	85.3	88.4
11 ...	31.6	34.8	38.1	41.3	44.5	47.7	51.0	54.2	57.4	60.6	63.8	67.1	70.3	73.5	76.7	80.0	83.2	86.4	89.6	92.8
12 ...	34.0	37.3	40.6	44.0	47.3	50.6	54.0	57.3	60.6	64.0	67.3	70.6	74.0	77.3	80.6	84.0	87.3	90.6	94.0	97.3
13 ...	36.3	39.7	43.2	46.6	50.1	53.5	57.0	60.4	63.8	67.3	70.7	74.2	77.6	81.1	84.5	88.0	91.4	94.8	98.3	101.7
14 ...	38.6	42.2	45.7	49.3	52.8	56.4	60.0	63.5	67.1	70.6	74.2	77.7	81.3	84.8	88.4	92.0	95.5	99.1	102.6	106.2
15 ...	41.0	44.6	48.3	52.0	55.6	59.3	63.3	66.6	70.3	74.0	77.6	81.3	85.0	88.6	92.3	96.0	99.6	103.3	107.0	111.6
16 ...	43.3	47.1	50.8	54.6	58.4	62.2	66.0	69.7	73.5	77.3	81.1	84.8	88.6	92.4	96.2	100.0	103.7	107.5	111.3	115.1
17 ...	45.6	49.5	53.4	57.3	61.2	65.1	69.0	72.8	76.7	80.6	84.5	88.4	92.3	96.2	100.4	104.0	107.8	111.7	115.6	119.5
18 ...	48.0	52.0	56.0	60.0	64.0	68.0	72.0	76.0	80.0	84.0	88.0	92.0	96.0	100.0	104.0	108.0	112.0	116.0	120.0	124.0
19 ...	50.3	54.4	58.5	62.6	66.7	70.8	75.0	79.1	83.2	87.3	91.4	95.5	99.6	103.7	107.8	112.0	116.1	120.2	124.3	128.4
20 ...	52.6	58.6	61.1	65.3	69.5	73.7	78.0	82.2	86.4	90.6	94.8	99.1	103.3	107.5	111.7	116.0	120.2	124.4	128.6	132.8
21 ...	55.0	59.3	63.6	68.0	72.3	76.6	81.0	85.3	89.6	94.0	98.3	102.6	107.0	111.3	115.6	120.0	124.3	128.6	134.3	137.3
22 ...	57.3	61.7	66.2	70.6	75.1	79.5	84.0	88.4	92.8	97.3	101.7	106.2	111.6	115.1	121.5	124.0	128.4	132.8	137.3	141.7
23 ...	59.6	64.2	68.7	73.3	77.8	82.4	87.0	91.5	95.1	100.6	105.2	109.7	114.3	118.8	123.4	128.0	132.5	137.0	141.6	146.2
24 ...	62.0	66.6	71.3	76.0	80.6	85.3	90.0	94.6	99.3	104.0	108.6	113.3	118.0	122.6	127.3	132.0	136.6	14.31	146.0	15.06

If Ceilings not required, multiply sizes and Deduct.

Square Yards and Feet of Walls in Rooms 10-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	14.3	16.8	19.4	22.0	24.5	27.1	29.6	32.2	34.7	37.3	39.8	42.4	45.0	47.5	50.1	52.6	55.2	57.7	60.3	62.8
4	16.8	19.5	22.2	24.8	27.5	30.2	32.8	35.5	38.2	40.8	43.5	46.2	48.8	51.5	54.2	56.8	59.5	62.2	64.8	67.5
5	19.4	22.2	25.0	27.7	30.5	33.3	36.1	38.8	41.6	44.4	47.2	50.0	52.7	55.5	58.3	61.1	63.8	66.6	69.4	72.2
6	22.0	24.8	27.7	30.6	33.5	36.4	39.3	42.2	45.1	48.0	50.8	53.7	56.6	59.5	62.4	65.3	68.2	71.1	74.0	76.8
7	24.5	27.5	30.5	33.5	36.5	39.5	42.5	45.5	48.5	51.5	54.5	57.5	60.5	63.5	66.5	69.5	72.5	75.5	78.5	81.5
8	27.1	30.2	33.3	36.4	39.5	42.6	45.7	48.8	52.0	55.1	58.2	61.3	64.4	67.5	70.6	73.7	76.8	80.0	83.1	86.2
9	29.6	32.8	36.1	39.3	42.5	45.7	49.0	52.2	55.4	58.6	61.8	65.1	68.3	71.5	74.7	78.0	81.2	84.4	87.6	90.8
10	32.3	35.5	38.8	42.2	45.5	48.8	52.2	55.5	58.8	62.2	65.5	68.8	72.2	75.5	78.8	82.2	85.5	88.8	92.2	95.5
11	34.7	38.2	41.6	45.1	48.5	52.0	55.4	58.8	62.3	65.7	69.2	72.6	76.1	79.5	83.0	86.4	89.8	93.3	96.7	100.2
12	37.3	40.8	44.4	48.0	51.5	55.1	58.6	62.2	65.7	69.3	72.8	76.4	80.0	83.5	87.1	90.6	94.2	97.7	101.3	104.8
13	39.8	43.5	47.2	50.8	54.5	58.2	61.8	65.5	69.2	72.8	76.5	80.2	83.8	87.5	91.2	94.8	98.5	102.2	105.8	109.5
14	42.4	46.2	50.0	53.7	57.5	61.3	65.1	68.8	72.6	76.4	80.2	84.0	87.7	91.5	95.3	99.1	102.8	106.6	110.4	114.2
15	45.0	48.8	52.7	56.6	60.5	64.4	68.3	72.2	76.1	80.0	83.8	87.7	91.6	95.5	99.4	103.3	107.2	111.1	115.0	118.8
16	47.5	51.5	55.5	59.5	63.5	67.5	71.5	75.5	79.5	83.5	87.5	91.5	95.5	99.5	103.5	107.5	111.5	115.5	119.5	123.5
17	50.1	54.2	58.3	62.4	66.5	70.6	74.7	78.8	83.0	87.1	91.2	95.3	99.4	103.5	107.6	111.7	115.8	120.0	124.1	128.2
18	52.6	56.8	61.1	65.3	69.5	73.7	78.0	82.2	86.4	90.6	94.8	99.1	103.3	107.5	111.7	116.0	120.2	124.4	128.6	132.8
19	55.2	59.5	63.8	68.2	72.5	76.8	81.2	85.5	89.8	94.2	98.5	102.8	107.2	111.5	115.8	120.2	124.5	128.8	133.2	137.5
20	57.7	62.2	66.6	71.1	75.5	80.0	84.4	88.8	93.3	97.7	102.2	106.6	111.1	115.5	120.0	124.4	128.8	133.3	137.7	142.2
21	60.3	64.8	69.4	74.0	78.5	83.1	87.6	92.2	96.7	101.3	105.8	110.4	115.0	119.5	124.1	128.6	133.2	137.7	142.3	146.8
22	62.8	67.5	72.2	76.8	81.5	86.2	90.8	95.5	100.2	104.8	109.5	114.2	118.8	123.5	128.2	132.8	137.5	142.2	146.8	151.5
23	65.4	70.2	75.0	79.7	84.5	89.3	94.1	98.8	103.6	108.4	113.2	118.0	122.7	127.5	132.3	137.1	141.8	146.6	151.4	156.2
24	68.0	72.8	77.7	82.6	87.5	92.4	97.3	102.2	107.1	112.1	114.8	121.8	126.7	131.5	136.4	141.3	146.2	151.1	156.0	160.8

Square Yards and Feet of Walls in Rooms 11-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	15.6	18.4	21.2	24.0	26.7	29.5	32.3	35.1	37.8	40.6	43.4	46.2	49.0	51.7	54.5	57.3	60.1	62.8	65.5	68.4
4	18.4	21.3	24.2	27.1	30.0	32.8	35.7	38.6	41.5	44.4	47.3	50.2	53.1	56.0	58.8	61.7	64.6	67.5	70.4	73.6
5	21.2	24.2	27.2	30.2	33.2	36.2	39.2	42.2	45.2	48.2	51.2	45.2	57.2	60.2	63.2	66.2	69.2	72.2	75.2	78.2
6	24.0	27.1	30.2	33.3	36.4	39.5	42.6	45.7	48.8	52.0	55.1	58.2	61.3	64.4	67.5	70.6	73.7	76.8	80.0	83.1
7	26.7	30.0	33.2	36.4	39.6	42.8	46.1	49.3	52.5	55.7	59.0	62.2	65.4	68.6	71.8	75.1	78.3	81.5	84.7	88.0
8	29.5	32.8	36.2	39.5	42.8	46.2	49.5	52.8	56.2	59.5	62.8	66.2	69.5	72.8	76.2	79.5	82.8	86.2	89.5	92.8
9	32.3	35.7	39.2	42.6	46.1	49.5	53.0	56.4	59.8	63.3	66.7	70.2	73.6	77.1	80.5	84.0	87.4	90.8	94.3	96.7
10	35.1	38.6	42.2	45.7	49.3	52.8	56.4	60.0	63.5	67.1	70.6	74.2	77.7	81.3	84.8	88.4	92.0	95.5	99.1	102.6
11	37.8	41.5	45.2	58.8	52.5	56.2	59.8	63.5	67.2	70.8	74.5	78.2	81.8	85.5	89.2	92.8	96.5	100.2	103.8	107.5
12	40.6	44.4	48.2	52.0	55.7	59.5	63.3	67.1	70.8	74.6	78.4	82.2	86.0	89.7	93.5	97.3	101.1	104.8	118.6	112.3
13	43.4	47.3	51.2	55.1	59.0	62.8	66.7	70.6	74.5	78.4	82.3	86.2	90.1	94.0	97.8	101.7	105.6	109.5	113.4	117.4
14	46.2	50.2	54.2	58.2	62.2	66.2	70.2	74.2	78.2	82.2	86.2	90.2	94.2	98.2	102.2	106.2	110.2	114.2	118.2	122.2
15	49.0	53.1	57.2	61.3	65.4	69.5	73.6	77.7	81.8	86.0	90.1	94.2	98.3	102.4	106.5	110.6	114.7	118.8	123.0	127.1
16	51.7	56.0	60.2	64.4	68.6	72.8	77.1	81.3	85.5	89.7	94.0	98.2	102.4	106.6	110.8	115.1	119.3	123.5	127.7	132.0
17	54.5	58.8	63.2	67.5	71.8	76.2	80.5	84.8	89.2	93.5	97.8	102.2	106.5	110.8	115.2	119.5	123.8	128.2	132.5	136.8
18	57.3	61.7	66.2	70.6	75.1	79.5	84.0	88.4	92.8	97.3	101.7	106.2	110.6	115.1	119.5	124.0	128.4	132.8	137.3	141.7
19	60.1	64.6	69.2	73.7	78.3	82.8	87.4	92.0	96.5	101.1	105.6	110.2	114.7	119.3	123.8	128.4	133.0	137.5	142.1	146.6
20	62.8	67.5	72.2	76.8	81.5	86.2	90.8	95.5	100.2	104.8	109.5	114.2	118.8	123.5	128.2	132.8	137.5	142.2	146.8	151.5
21	65.6	70.4	75.2	80.0	84.7	89.5	94.3	99.1	103.8	108.6	113.4	118.2	123.0	127.7	132.5	137.3	142.1	146.8	151.6	156.4
22	68.4	73.3	78.2	83.1	88.0	92.8	97.7	102.6	107.5	112.4	117.3	122.2	127.1	132.0	136.8	141.7	146.6	151.5	156.4	161.3

Deduct size of Ceilings if not required.

Halls and Passages.—If *Through* are taken, deduct twice width by height.
Divide by 9 for yards, and deduct from table.
If *walls* alone are required, multiply the length and breadth of wall taken, divide by 9 for yards, and deduct from table.

Square Yards and Feet of Walls in Rooms 12-foot high, including Ceilings.

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
3	17.0	20.0	23.0	26.0	29.0	32.0	35.0	38.0	41.0	44.0	47.0	50.0	53.0	56.0	59.0	62.0	65.0	68.0	71.0	74.0
4	20.0	23.1	26.2	29.3	32.4	35.5	38.6	41.7	44.8	48.0	51.1	54.2	57.3	60.4	63.5	66.6	69.7	72.8	76.0	79.1
5	23.0	26.2	29.4	32.6	35.8	39.1	42.3	45.5	48.7	52.0	55.2	58.4	61.6	64.8	68.1	71.3	74.5	77.7	81.0	84.2
6	26.0	29.3	32.6	36.0	39.3	42.6	46.0	49.3	52.6	56.0	59.3	62.6	66.0	69.3	72.6	76.0	79.3	82.6	86.0	89.3
7	29.0	32.4	35.8	39.3	42.7	46.2	49.6	53.1	56.5	60.0	63.4	66.8	70.3	73.7	77.2	80.6	84.4	87.5	91.0	94.4
8	32.0	35.5	39.1	42.6	46.2	49.7	53.3	56.8	60.4	64.0	67.5	71.1	74.6	78.2	81.7	85.3	88.8	92.4	96.0	99.5
9	35.0	38.6	42.3	46.0	49.0	53.3	57.0	60.6	64.3	68.0	71.6	75.3	79.0	82.6	86.3	90.0	93.6	97.3	101.0	104.6
10	38.0	41.7	45.5	49.3	53.0	56.8	60.6	64.4	68.2	72.0	75.7	79.5	83.3	87.1	90.8	94.6	98.4	102.2	106.0	109.7
11	41.0	44.8	48.7	52.6	56.5	60.4	64.3	68.2	72.1	76.0	79.8	83.7	87.6	91.5	95.4	99.3	103.2	107.1	111.0	114.8
12	44.0	48.0	52.0	56.0	60.0	64.0	68.0	72.0	76.0	80.0	84.0	88.0	92.0	96.0	100.0	104.0	108.0	112.0	116.0	120.0
13	47.0	51.1	55.2	59.3	63.4	67.5	71.6	75.7	79.8	84.0	88.1	92.2	96.3	100.4	104.5	108.6	112.7	116.8	121.0	125.1
14	50.0	54.2	58.4	62.6	66.8	71.1	75.3	79.5	83.7	88.0	92.2	96.4	100.6	104.8	109.1	113.3	117.5	112.7	126.0	130.2
15	53.0	57.3	61.6	66.0	70.3	74.6	79.0	83.3	87.6	92.0	96.3	100.6	105.0	109.3	113.6	118.0	122.3	126.6	131.0	135.3
16	56.0	60.4	64.8	69.3	73.7	78.2	82.6	87.1	91.5	96.0	100.4	104.8	109.3	113.7	118.2	122.6	127.1	131.5	136.0	140.4
17	59.0	63.5	68.1	72.6	77.2	81.7	86.3	90.8	95.4	100.0	104.5	109.1	113.6	118.2	122.7	127.3	131.8	136.4	141.0	145.5
18	62.0	66.6	71.3	76.0	80.6	85.3	90.0	94.6	99.3	104.0	108.6	113.3	118.0	122.6	127.3	132.0	136.6	141.3	146.0	150.6
19	65.0	69.7	74.5	79.3	84.1	88.8	93.6	98.4	03.2	108.0	112.7	117.5	122.3	127.1	131.8	136.6	141.4	146.2	151.0	155.7
20	68.0	72.8	77.7	82.6	87.5	92.4	97.3	102.2	107.1	112.0	116.8	121.7	126.6	131.5	136.4	141.3	146.2	151.1	156.0	160.8
21	71.0	76.0	81.0	86.0	91.0	96.0	101.0	106.0	111.0	116.0	121.0	126.0	131.0	146.0	141.0	146.0	151.0	156.0	161.0	166.0
22	74.0	79.1	84.2	89.3	94.4	99.5	104.6	109.7	114.8	120.0	125.1	130.2	135.3	140.4	145.5	150.6	155.7	160.8	166.0	171.1

To make **glue waterproof** add a little bromate of potash to the water.

Another method: Dissolve glue in linseed oil over a slow fire.

To treat plaster walls before painting, apply ½ gold size, ½ turps.

WHITE ANT EXTERMINATOR AND INSECT DESTROYER.

One of the simplest and most effective; used as a spray. Mix—arsenate of soda, 1lb.; warm water, 4 gal., by adding molasses the insects become cannibalistic and eat each other.

RECIPES.

GOOD ROUGH PAINT FOR ROOFS AND OUTBUILDINGS.

Mix slowly 1 gal. crude petroleum with 3lbs. brown metallic. Thin down with a little coal oil. Apply as ordinary paint.

TO CLEAN PAINT WITHOUT DETERIORATING OR AFFECTING SAME.

Dip a piece of flannel or felt in hot water and powdered whiting and apply briskly.

Hot water and ammonia, a tablespoonful to a quart, wiped over surface to remove grease and dirt.

WHITEWASH.

2lbs. sulphate of zinc, 1lb. salt to ½ bushel of lime, will adhere firmly on wood or galvanised iron, forming a cooling covering.

COLOURED WASHES.

1 bushel of lime, 4lbs. yellow ochre, makes good cream colour.

2lbs. Indian red, 7lbs. amber, 2lbs. lamp black, makes good fawn colour.

7lbs. raw umber, 4lbs. lamp black, makes good buff stone colour.

CLEANING DOWN, &c.

Remove splashes from windows:—Hot solution of soda and water.

Remove splashes from floors.—Use turpentine.

Te remove Paint or Varnish from woodwork or machinery—

(1) Dissolve 1lb. of potash in a gallon of water and apply with an old mop.

(2) Let it remain for ten minutes, when the paint will wash off

(3) The addition of a little hot lime is an improvement.

To stain wood Mahogany.—If soft wood is washed with a solution of nitric acid it will take on a brown stain having the appearance of mahogany.

TO REMOVE PAINT FROM BRICK WALLS.

Dissolve 10lbs. of caustic soda or saponified lye in 5 gal. of water, and stir into the solution 5 quarts mineral oil; add enough sifted sawdust to make a paste. Plaster this thickly on the old paint, and in a few hours scrape off the dissolved substance. To repaint the wall, clean with water, and a coat of vinegar to neutralise the alkali that may have remained in the pores of the brickwork.

Or another.—Slake in one vessel a quantity of lime, and in another vessel dissolve same weight of soda ash, leaving overnight. Mix both together next day, adding enough whiting to make a paste, and apply this to the old paint. Well rinse the wall when the paint has been removed, apply a coat of vinegar before repainting.

When **red bricks** of a fireplace become **discoloured** with soot or otherwise, rub with brickyard dust paste; or paint the bricks with boiled linseed oil all they will absorb. This treatment may be repeated if the bricks are much discoloured.

PAPER HANGER.

This trade has been almost revolutionized in recent years; the old tawdry, staring papers have given place to productions that are thoroughly artistic in designs and improvement in the material employed.

A piece of paper is 36 feet long by 21 inches wide, and contains 63 sup. feet, or 7 sup. yards, but the ends are generally injured by packing, exposure, unrolling, &c.; in papering there is also a further waste in matching the ends according to the size of the pattern; an allowance must therefore be made from 5 to 9 super. feet, in calculating the number of pieces required for a given area, after deducting the openings. Any portion of a piece required is charged as a whole piece.

TABLE FOR MEASURING ROOMS FOR PAPER.

Measure Round the Walls in Feet. Including Doors, Windows, &c., andnot exceeding these measures.

Height in Feet.			20	24	28	32	36	40	44	48	52	56	60	64	68	72
7½ and under		8	3	3	4	4	5	5	6	6	7	8	8	9	9	10
8	,,	8½	3	3	4	5	5	6	6	7	7	8	8	9	9	10
8½	,,	9	3	4	4	5	5	6	7	7	8	8	9	9	10	11
9	,,	9½	3	4	4	5	6	6	7	7	8	9	9	10	10	12
9½	,,	10	3	4	5	5	6	7	7	8	9	9	10	10	11	12
10	,,	10	4	4	5	5	6	7	8	8	9	10	10	11	12	13
10½	,,	11	4	4	5	6	7	7	8	9	9	10	11	11	12	13
11	,,	11½	4	5	5	6	7	8	8	9	10	11	11	12	13	14
11½	,,	12	4	5	6	6	7	8	8	9	10	11	12	12	13	14
12	,,	12½	4	5	6	7	7	8	9	9	10	11	12	13	14	15
12	,,	13	4	5	6	7	8	8	9	10	11	12	13	14	14	15
13	,,	13½	5	5	6	7	8	9	10	11	11	12	13	14	15	16
13½	,,	14	5	5	6	7	8	9	10	11	12	13	14	14	15	16
14	,,	14½	5	6	7	8	9	9	10	11	12	13	14	15	16	17
14½	,,	15	5	6	7	8	9	10	11	12	13	14	14	15	16	17

Rule.—Find the height of the room between the skirting and cornice in the left hand column, and the nearest Figures to the measures round the Walls on the top line; the figures where the two lines would cross or meet will show the number of pieces a room will take.

To find the quantity of Paper required for Ceilings, multiply the length and breadth in feet together, and divided by 50.

Wages of Paperhanger, 2/6 per hour. For Special Work, 2/8 per hour.

Wall Papers. British Wall Papers, variety of high-class hand and machine printed decorations. Plain and Figured Satins, Plain Oatmeals, Brulaps, Floral Tapestry effects, Imitation Grass Cloths, Imitation Leathers. Price per roll, from 2/6; 3/6 hand-made. Labor, hanging per roll, from 2/6 per roll; hand made, 2/9.

Light and Dark Pulps, in Floral, Geometrical, and other designs. In variety of colors and patterns. Specially suited for bedrooms. Price per roll, from 8d. Labour, ordinary, 2/- per roll.

Wall Paper, for Shops, Halls, Passages, Staircases, etc., in imitation of Sienna and other Marbles, Tiles, etc., as well as Oak, Maple, and wood of various kinds. Price per roll, from 3/6. Labor, from 2/6 per roll.

Wall Paper Friezes, to match the Papers. Supplied in with 10½in. and 21in.

Floral Borders, for Wall Papers. Widths, 2, 3, 4, 5, and 7ins. Prices, 1d., 1½d., 2d. 3d., 4d. yd.

Panelling Borders. Widths, 1, 2, 3, 4, 5, and 7ins. Prices, 2d., 4d., 6d., 7d., 10½d., 1/- yd.

Cut-out Borders and Feiezes. Widths, 2, 3, 4, 5, 7, and 10½ins. Prices, 3d., 4d., 5d., 6d., 7d., 1/- yd. Labor, hanging, from 3d. to 6d. per yard.

Sanitary Wall Paper, being stained, or printed in Oil, is less likely to absorb injurious particles. It can be washed with warm water when soiled. Price per roll, from 1/3. Labour, hanging, from 1/9 per roll.

Labor, Ceiling Papers, 20 per cent. or 6d. per roll extra.

Labor, 2/6 per hour, per square yard only.	From	To
	s. d.	s. d.
Straining canvas, including tacks and slipping ...	1 6	2 3
Hanging lining paper per roll	1 0	2 0
Ditto common or satin paper	1 0	2 0
Ditto flock	1 0	3 0
Pumicing lining paper	0 4	0 6
Hanging borders, per doz. yards	1 6	2 6
Plain crepes	2 0	3 0
Sizing, 2 coats, and varnishing paper	3 0	4 0
Ditto do. and twice varnishing	3 6	5 0
Extras.		
Hanging horizontal papers	4 0	6 0
Hanging ingrain borders, 12in. to 18in., per yard ...	0 4	
Ditto, " Lignomur," Anaglypta," &c., per panel ...	1 0	3 6

For superior decorations no prices can be quoted, since the cost of hanging entirely depends on the design and the number, size, and shape of the panels.

Ridgeley's " Ideal " Trimmer, for common or special papers This cutter trims " Anaglypta," and other raised material. Price for outfit, complete :—6ft., 32/- ; 7ft., 35/- ; 8ft., 37/- ; 9ft., 40/-

PASTES.

Paste for Papering Painted Work.

Mix the flour and water thinner ; to each gallon add 1oz. resin. For Sanatile or stiff paper add glue or size.

Labelling Paste for Tin.

Mix stiff paste of flour and water, 1 gal. ; add 2oz. tartaric acid. 1 pint treacle. Boil stiff, preserve with ¼oz., or 10 drops.

Paste for Paper to Iron or Metal.

Boil dextrine and water to consistency of very thin glue. Remove all traces of grease or oil with limewash previously.

PLASTERER.

MEASUREMENT.

In **Measuring Plastering** a variety of opinions exist, all of them tending more or less to misunderstanding, and consequent litigation.

The least objectionable method is to take the *net measurement* at a price calculated to meet the cost of the work under consideration, including all extras.

Walls and ceilings by the super yard.

Cornices and mouldings by the running foot, per inch girth. Ordinary openings with 4½ in. reveals are not deducted as the extra work in reveals, is reckoned equal to opening.

The weathering of cornices to be taken as plain work.

Panels, mitres, returns, columns, caps and bases, balusters, dentil blocks, and patterns, &c., so much each, according to dimensions.

Narrow widths, dadoes, skirtings, &c., kept separate and reckoned by the lineal ft.

Rough cast, lined work, projecting quoins, basecourses, kept separate and reckoned accordingly.

Or priced extra on plain body work, according to the cost of extra labor.

If circular, add one-fourth, if circular circular, as in domes or concentric arches, add one-half to each item.

Scaffolding to be charged extra, if erected expressly for the work.

In taking the height of walls for inside plastering measure down to *skirting grounds*.

If no grounds, then down to the floor, deducting all openings except for "labor only."

If more than mitres in one room they are reckoned in measuring cornices.

MEMORANDA.

Portland Cement Stucco should be rendered and set, or *roughed* in and finished in two coats; the second, or setting coat, can be added before the first coat dries, otherwise it must be scored deeply to form "key" for following coat. In every case the walls should be watered before the stucco is applied; it is also necessary, if the cement is to become hard throughout, or properly set, that it be saturated with water daily, from 3 to 14 days, according to the heat of the weather, until there is no more suction, otherwise the cement stucco or plaster will merely have a hard surface, while the bulk remains a dry powder. Really good cements are often badly treated.

Porosity.—All exposed flat surfaces, or weatherings, should be set in 1 to 1 cement, the addition of sand makes it porous in proportion to the quantity used.

Plasterers' Putty for finishing coat of plaster work is lime dissolved in water, screened through hair sieve into boxes, allowed to settle and sweeten 7 days.

Gauged Stuff is made by mixing before use 3 to 4 parts of the above Putty with 1 part of Plaster of Paris.

Trowelling the finishing surface should not be done too much as it causes fine cracks to appear when dry.

To prevent Plaster of Paris setting too quickly add sprinkled sugar or add acetic acid.

The tints used for the setting coats are generally French grey, drab, buff or salmon.

Special cold water paints, " Kalsomines," ' Indelablo," &c., of all tints, can be applied safely after 6 months' drying, when the mellowed plaster will not affect or alter the tint.

COVERING POWER OF PLASTER.

" **Floating** " or first body coat of plaster, for internal walls only.

1½ bags of stone lime, 1 cubic yard of sand will cover 50 super yards ½in. thick, or about 70 yards including general openings of cottages, or 1 bag lime and 1 load Sydney sand will cover 40 square yards ¾in. thick, or 60 square yards ½in. thick.

1 bag of stone lime run into **Putty** will " set " or finish coat 50 super yards.

" **Pricking up** " **Stuff**, body coat for lathed ceilings, ¾in. thick—3 bags stone lime, 1 bag of cow's hair = about 2 bushels; mixed with 1 cubic yard sand will cover 100 square yards on Oregon sawn laths; or 1 bag lime, ½ cubic yard sand, ¼ bushel hair will do 30 square yards on scrim, or 35 yards on laths alone.

If on expanded metal lathing it will take 4 bags of lime to cover 100 super yards.

If *scrim* is used, 2½ bags of stone lime to the 100 yards.

One load sand mixed with ⅔ bag of lime will cover or " float " 40 square yards.

Shell lime slacked will pass through a 16 mesh.

Stone lime, ditto, 30 mesh. A good mixture for " setting."

1 bag stone lime " putty " will cover 70 square yards of " setting " of interior walls.

Generally the mortar is reckoned at one-third stone lime and two-thirds clean sand, mixed with long ox hair—thickness, ¾in.

1 cubic yard contains 21 bushels.

1 cask of cement contains 3½ cubic feet.

6 casks to the cubic yard.

7/9th cubic ft. = 1 bushel.

Covering capacity of 1 bag 125lbs. Portland cement when mixed in the following proportions of sand—

Thickness	½in.	¾in.	1in.
Cement neat ... ...Square yards	2 3/4	2	1½
125lb. bag cement—1 to 1 sand ,,	4½	3 1/4	2
,, ,, 1 to 2 ,, ,,	6	4 2/3	3
,, ,, 1 to 3 ,, ,,	8.6	6¼	4⅓
,, ,, 1 to 4 ,, ,,	10	8¾	5½
,, ,, 1 to 5 ,, ,,	13.4	10	6 3/4
,, ,, 1 to 6 ,, ,,	7	12½	8⅔

PLASTERERS' MATERIALS.

Subject to Fluctuation.

A 4 gal. kerosene tin equals half a bushel.

	Sydney. £	s.	d.
Portland Cement, best brands, per cask	1	2	0
Ditto, per bag 125lbs. each	0	7	6
"**Meduca**" Cement, 3½bus. per cask	2	5	0
Keen's Cement, per cask, English imported	4	10	0
Stone Lime, per bag, 3 bushels	0	9	6
Shell Lime, per bag, 3 bushels	0	7	6
Plaster of Paris, per cask, 3½ bushels	2	2	0
Australian Plaster, "Diamond" in bags, per cwt.	0	9	6
Yellow Sydney Sand, per load, 23 cubic ft.	0	10	0
White Sydney Sand, per load, 23 cubic ft.	0	9	6
Nepean River Coarse Sand, at railway, per ton	0	3	0
Hair, long cow's, per bushel, 1/8; 3 bushel bag	0	8	0

WALLS AND CEILINGS.

Rendering, Lathing, etc.

Wages, 1922 Award Rates, 44 hours, 2/9 per hour.
Sewer Cement Plasterer, 46 hours at 2/6.

Per super yard.	Materials. s.	d.	Labor. s.	d.	Total Cost. s.	d.
Render or Plaster rough on walls	0	10	0	8	1	6
Ditto and set with fine stuff, 2 coats ...	1	2	1	4	2	6
Ditto, float, and set with tinted fine stuff (3 coats trowelled)	1	6	1	4	2	10
Lathing only, Oregon laths to partitions ...	1	3	0	5	1	8
,, and plaster, or lay one coat, do. ...	1	2	1	2	2	4
,, lay and set two coats do. ...	2	0	2	6	4	6
,, Expanded patent steel lathing partitions, floated	2	4	1	8	4	0
Expanded steel laths, lay, float and set to ceilings	2	4	1	10	4	2
If set with gauged putty, add...	0	4	0	2	0	6
,, with plaster of Paris, add	0	6	0	4	0	10

CORNICES, ETC., IN PLASTER OF PARIS.

Per foot run.	Materials. s.	d.	Labor. s.	d.	Total. s.	d.
Plain impost or other mouldings, 4in. girt	0	4	0	6	0	10
Ditto, from 8in. girt	0	9	0	8	1	5
Ditto, from 12in. girt	1	0	1	0	2	0
Cornices, with soffit and frieze, the whole girt to be taken at per foot super	1	0	1	0	2	0

PORTLAND CEMENT STUCCO.

Per yard super.	Materials. s. d.	Labor. s. d.	Total s. d.
Rough render, in cement	1 6	1 3	2 9
Plain face, on brick or stone, jointed ...	1 6	1 6	3 0
Rough cast, Bluestone, on ¼in. stucco ...	1 6	1 6	3 0
Cornices as before, per super ft.	0 8	1 4	2 0
Large skirting, per super ft.	0 8	1 0	1 8
Plain facia, frieze or pilasters, per super ft.	0 8	1 0	1 8
Astragals, ovolos, O.G.'s, and other mouldings, grooves or sinkings, under 4in. girt, per ft. run	...	0 2	0 4½
Ditto, from 4 to 8in. per ft. run	...	0 3	0 6
Ditto, from 8 to 12 in. girt, per foot run ...	...	0 4	0 8
4½in. reveals or margins, per ft. run ...	...	0 3	0 3
9in. do. do. do.	...	0 4½	0 4½

N.B.—The above prices for materials are reckoned at 7/6 per bag for Portland Cement, and 9d. per bushel for clean-washed sand mixed in the proportion of 1 of cement to 3 of sand, and averaging ¾in. thick.

If 1 of cement and 2 of sand is required, add one-fourth to the price of the materials.

Mitres and stops in Plaster or Cement, cornices, reckon 1ft. extra.

If wages or materials alter in price, add or deduct.

Material Required for ¾in. thickness of Compo.

Portland Cement Plastering—

1 bushel cement and 1 bushel sand will cover 3 sup. yards.

1 bushel cement and 1½ bushels of sand will cover 3¾ sup. yards.

1 bushel cement and 2 of sand, 4½ sup. yards.

1 bushel cement and 3 of sand, 6 sup. yards.

1 bushel cement and 4 of sand, 7½ sup. yards.

N.B.—By adding ½ to the number of sup. yards, the area at ½in. thick, or deducting one-third, the area at 1in. may be obtained.

Covering Power of Cement Stucco.

1 cask of Cement = 3⅓ cubic ft., and 2 casks of sand 7 cubic ft. When mixed will form about 9 cubic ft. (as 1½ cubic ft. being taken up by voids of sand) and will cover—

12 super yards, 1in. thick; 18 super yards, 3in. thick; 24 super yards, ½in. thick.

Labor.—One man will float and finish 18 square yards per day, or average 28 yards per hour, ¾in. thick.

Body coat of cement usually 1 to 4. Finishing coat, 1 to 2. Facing only, 1 to 1.

KEENE'S CEMENT.

70lbs. = ¼ cask Keene's cement (280lbs. per cask) will cover about 13 square yards ⅛in. thick on Portland cement ground.

70lbs. of Keene's Cement and 2 cwt. of sand for coring will cover 15 square yards ½in. thick. Allow 12 gals. of water for latter quantity.

Labor.—One man can finish 10 yards, ⅛in. thick, in 6 hours.

KEENE'S CEMENT WORK.

Dubbed out with Cement Compo.

Per yard super.	Materials. s. d.	Labor. s. d.	Total. s. d.
Superfine cement trowelled on brick or stone	2 6	2 6	5 0
Per foot super.			
Facias, jambs, pilasters, architraves	0 8	1 0	1 8
Plain mouldings, medium cement	0 9	1 2	1 11
Ditto, skirtings, 9 to 18in. high, with 3in. moulded, or sunk and moulded ...	0 9	1 6	2 3
Superfine cement, plain faced and polished ...	0 9	2 0	2 9

If circular, as in columns, grdins, &c., add one-third.

The above items are reckoned to contain one-third Keene's cement to two-thirds clean, sharp sand, and plain work to average $\frac{3}{4}$in. thick.

White Cement finish, same as Keene's, per square yard, 4/–.

LIME WHITE, WHITEWASHING, &c.

Per super yard.	Labor s. d.
Lime white, per coat (lime and water)	0 3
Ditto, two coats do.	0 4
Wash, stop, and white-washing with whiting and size to old work	0 6
Ditto, to old ceilings...	0 8
Plain cornice washed, stopped and whited, per foot super, with whiting and size—one coat, 4d.; two coats	0 6

Half a bushel of quick lime is required for 70 super yards of lime-white, one coat. 12lbs. whiting, $\frac{1}{2}$lb. blue black, and 7 quarts size will do the same quantity of white-wash, equal to 40 s. yds. per gal.

Cement stucco or plaster is often coloured with lime white, mixed with about one-fifteenth the quantity of raw linseed oil; black oil or common tallow will do if mixed hot or during the slaking of the stone lime.

One gallon will cover from 35 to 40 sup. yards one coat, or about 28 sup. yards two coats.

Although nearly waterproof, it will seldom withstand continuous driving rain on exposed walls.

LATHING.

Where space and weight are a consideration, thin, light and solid partitions on Steel Lathing can be used and fastened to $\frac{1}{4}$in. or $\frac{3}{8}$in. W.I. vertical rods or angle steel, spaced about 1 foot apart, tautly fixed and hooked into eye bolts screwed into ceiling and floor joists; plastered on both sides with a finished thickness of 2in., forms a very light, yet exceedingly strong, rigid, and practically fire and vermin proof wall, the combined steel and plaster work forming a monolithic slab able to withstand any reasonable pressure or thrust, in partitions from 14ft.

Two bundles of 4ft. 6in. x 1$\frac{1}{2}$in. Oregon laths will cover 11 sq. yards or 100 sq. feet.

Expanded Diamond mesh metal **Lathings** for plaster work in ceilings, partitions, &c., in sheets 9ft. x 2ft. wide, 26 gauge, 2/–; 24 gauge, 2/3; 22 gauge, 2/6 per square yard.

	Weight per Sq. lbs.	Per Sq. Yd. s. d.
Self Sentering, 10ft. x 29in.	5.85	6 0
Trussit, 10ft. x 19in.	5.13	6 0
Diamond Rib Lathing, 8ft. x 24in.	3.5	3 9
Herringbone Lathing, 8ft. x 20¼in.	2.2	3 0
Key Lathing, 8ft. x 24in.	2.2	2 9

Labor, fixing the cheaper lathing on walls, 9d.; ceilings, 1/– per square yard.

PARTITION FRAMING STEEL AND FASTENERS.

	20ft. Lengths.	Per lin. ft.
Cold Rolled Channels, ¾in., 2d.; 1in.		2½d.
Cold Rolled Slotted, 1½in., 4d.; 2in.		6d.
Corner Bead—Galv., 10ft. lengths, 3d.; Exp. Metal Angle, 8ft. lengths		4d.
Self Sentering Clips, No. 4-4-10, 1/6 doz.; No. 7, 2/–; Trussit Clips		1/9

See Concrete Section.

AN AVERAGE DAY'S WORK (8 hours) of a good TRADESMAN PLASTERER.

Laborer (scaffoling not included).

Floating walls only, 75 square yards in picking up lime mortar.

Floating Ceilings, 65 square yards.

Setting Walls, 75 sq. yards, in fine screened lime and plaster of Paris.

Ditto, if fine trowelling, 50 sq. yards.

Setting Ceilings, 60 sq. yards.

Setting Cornices, Plaster Mould, Straight run, 9in. x 6in. or 16 girt, 50 feet and 4 mitres.

Setting Room, 15ft. x 12ft., containing 20 yds, ceiling, 3ft. frieze,

Ditto, 45ft. 9ft. x 6ft. Cornice and 8 mitres 5 ft. chimney breast.

TWO MEN, ONE DAY (*Laborer or scaffolding not included*).

CEMENT MORTAR WORK.

Cementing walls, ¼in. thick, 35 sq. yards per day.

Cement skirting, 9in. x 1in., one man, 60 ft. run per day.

Cement coping, 15in. x 4in., per yard overall, 12 yards per day.

Cement cornice mould, 9ft. x 6in. (4 members), 35ft. run.

Forming each mitre or return of abovementioned, 3/4 hour each extra.

Cementing No. 12 Concrete Lintels, 5ft. 12in. face and 4in. soffit.

Cementing Bressimer, No. 3, 24ft. long, 2ft. face, 1 ft. soffit in dry cement.

Cementing plain cement floors, 1in. thick, finished smooth, 15 sq. yards.

Ditto, ¾in. thick, 18 sq. yards.

Cementing Paths, finished smooth and jointed, if coloured red, 12 sq. yards.

Cement Rough Cast, fine metal, ¼in. straight work, 40 sq. yards.

Ground floor work, General, 1 labourer, can supply 2 plasterers "floating," or 6 plasterers setting.

FIBROUS PLASTER.

FIBROUS PLASTER CEILINGS AND CORNICES.

Its peculiar adaptability for all classes of building, its straight, smooth surface, the beauty and variety of designs; its wonderful fire-resisting qualities, and the facility with which it can be forwarded to any part of the Commonwealth have brought it into general use.

CEILINGS. In Sheets 8 to 12 ft. long.	Material. s. d.	Fixed. s. d.
Ceiling, Plain panels, 1ft. 6in. to 4ft. 6in. wide	2 3	5 6
Ditto, " Artic," " Rocco," or Muranese pattern ...	2 3	
Ornamental pattern, f.o.b. Sydney, from	2 6	to 3 0
Plain panels fixed with gal. clouts on 2in. x 1in. battens, with 2 x ½ plaster cover strips, complete	5 6	to 6 6
Cover strips, plaster, 2in. x ½in., 11/–; 3in. x ½in., per 100ft.	25 0	
Cover Strips, Oregon, 2in. x ½in., 8/– to 10/–; 2½in. x ½in., 11/6; 3in. x ½in.	12 0	
Double dressed, 3½in. x ½in., 12/– to 14/–; 4in. x ½in., per 100	13 0	to 16 0

CORNICES.

	Per ft. run. s. d.	Fixed. s. d.
Cornices (Plaster, Ovolo, Scotia, etc.)—		
3in. girt	0 4	
4in. girt	0 5	
6in. girt	0 6	
9in. girt	0 9	
About 1d. per ft. run per inch girt.		
„ 2½in. from	4 3	0 5
„ 4 x 3¼ girt 5...	0 5	0 6
„ 7½ x 6 „ 9...	0 10	1 0
„ 8 x 6 „ 10...	1 3	1 6
„ 6 x 11	1 9	2 3
„ 10 x 10	2 3	2 9
„ 9 x 11	2 3	2 9
Friezes, 18in. deep Ornamental	1 6	2 0
„ 20in. „	2 0	2 6
Capitals and **Columns** covering, 8ft. column... ...	...	£4 10 0
Soffits of Beams and **Girders Casing**—		£ s. d.
Fixed, per ft. super.		0 1 9

Firring not included.

Soffits of stairs and spandrils, fixed, per yard, from ... 0 6 6

White Plaster, a new plastering material, made by Newmarch on Trent, to be mixed with lime putty and washed sand, forming a cement surface of exceptional hardness and strength.

" Embosoid," " Gypsboard," Fibrous Plaster Board, and " Socket" Board are trade names of above prepared ceiling sheets.

See advt., pp. 2, 13, 26.

MODELLER, &c.
Labor, 28/- per day.

Items each.	Modelling. £ s. d.	Plaster Castings fixed. £ s. d.
Ionic capital, for 12in. column	6 0 0	3 4 0
Ditto 18in. column	9 0 0	4 0 0
Ditto 24in. column	12 0 0	6 0 0
Corinthian or Composite capital, for 12in. column	7 10 0	4 0 0
Ditto do. 18in. column	10 10 0	6 0 0
Ditto do. 24in. column	14 0 0	8 0 0
Pilasters the same as capitals, quarter pilasters one-half.		
Modillon enriched, 4in. projection	1 10 0	0 3 0
Ditto 6in. projection	1 16 0	0 4 6
Ditto 8in. projection	2 0 0	0 6 0
Trusses enriched, 10in. x 5in.	1 16 0	0 10 0
Ditto 12in. x 6in.	2 2 0	0 12 0
Ditto 18in. x 9in.	3 0 0	0 18 0
Paterae or rosette, 4in. diam.	0 12 0	0 2 0
Ditto 8in. diam.	0 10 0	0 6 0
Centre or ceiling flower, 2in. diam. ...	1 16 0	0 8 0
Ditto 18in. diam. ...	2 8 0	0 8 0
Head on keystone, 12in. deep	1 7 0	1 0 0
Ditto 15in. deep	1 10 0	1 8 0
Ditto 18in. deep	1 16 0	1 12 0
Acanthus, or lotus leaf, 8in. high	0 18 0	0 4 0
Ditto 12in. high	1 7 0	0 8 0
Oak or laurel wreath, 9in. diam.	1 10 0	0 6 0
Ditto 12in. diam.	2 2 0	0 8 0
Ditto 18in. diam.	2 14 0	0 12 0
Per foot run.		
Egg and dart moulding, 2in. girt	1 0 0	0 1 0
Ditto do. 4in. girt	0 18 0	0 1 4
Ditto do. 6in. girt	1 8 0	0 1 8
Rope or cable do. 2in. girt	1 0 0	0 1 6
Ditto, round spiral column	1 4 0	0 2 6

Casting Ceiling Flowers from 2ft. to 5ft. diam. will cost about 4/- per sup. ft., as ascertained by squaring the diam (2ft. diam. = 4 sup. ft. and 3ft. diam = 9 sup. ft., &c.).

PATENT FLOORINGS AND PAVINGS.

There are on the market several materials for covering concrete, wood or brick floors.

Some of these materials have Portland cement as a matrix. The preparations known as "**Ironite,**" "**Arkilite,**" &c., adhere perfectly to concrete or brick. Others, however, of **magnesite composition,** have the further advantages that they also adhere equally well to wood or iron, and whilst capable of hard, wear-resisting finish, have a resilience that renders them almost like a linoleum to the tread, which makes

them very acceptable for indoor flooring. They also are made in various permanent colourings so that most artistic effects can be produced.

Further particulars can be obtained from the several makers (*see* advertisements herein), who afford special quotations according to the description and quantity of work required.

MAGNASITE FLOORINGS.

Magnasite Floorings, generally laid on site in various colours, from cream, greens, blues, reds and browns, forming a jointless composition sawdust paving or walling with different names.

"**Aegypto**" (*agent's advt.*, p. 4), different designs, 12/– to 18/– per sq. yard, laid and finished.

"**Manco**" (*agent's advt.*, p. 22), 12/– to 15/– per sq. yard.

"**Permasite**" and "**Linwood**," similar constructed pavings but varying in composition and colouring (*see agent's advt.*, pp 28, 38), 12/– to 18/– per sq. yard, according to quantity.

Cupping and Skirting to bath-room walls, per ft. run, 9d.

Terrazzo effects can be produced in Magnasite floorings within the above price.

OTHER COMPOSITION PAVINGS.

There are many makes of cement composition. Pavings sold under different names, viz.–

"**Arkilite**," "**Ironite**," "**Steelite**," "**Oronite**," "**Xylite**," all about the one price—9/– to 11/– per yard, laid; also made into verandah nosings, door thresholds, &c., ready for setting.

Mottled Terrazzo is composition of cement in situ with chips of granite or marble of different colours, and worked into patterns, borders, letters, or elaborate designs, and afterwards ground down to uniform surface when drying. This material is also made in slabs and fixed as dadoes and wall covers in place of marble.

The price when laid is according to design, from 15/– to 30/–.

Quotations, *see manufacturer's advt.*, pp. 4, 15, and 42.

PATENT LIGHT AND STRONG STEEL-FRAMED STRUCTURES.

Hyrib Reinforcement, in Partitions, used horizontally, without intermediate studs. For price *see* Concrete Section.

Hyrib is made with deep strengthening ribs pressed into a flat perforated sheet of open hearth steel, and forms a rigid sheet lengthwise.

In suspended ceilings these sheets are placed with rib uppermost for strength, leaving the even surface under for plastering.

For partitions or walls about 2ins. thick the ends are secured by strong gal. iron staples or nails to wood or stout wire, and plate clips to iron supports. The ribs are generally placed horizontally, interlocking joints, with a cement body plaster of 1 cement to 4 sand or cinders, and formal finishing coat of white Keene's cement or Meduca Cement.

Reinforced Cement Walling, 2in. thick, bolted together in sections, per sq. yard, finished, 15/– to 21/–.

For further information, *see advt.*, pp. 38, 6.

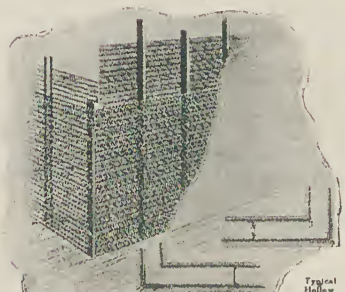
MOULDING PARTITIONS BEFORE ERECTING.

Make the frames of light steel angles, with cross bars, to which are wired any of the many forms of metal reinforcements, whether of woven wire mesh, expanded metal, patent lathing, Herringbone Expanded lathing, or steel rods.

Method.—These frames are laid upon a table or pallet, plled in with concrete and tamped solid, and left to harden.

The sections are erected in a cradle before being thoroughly dry, bolted together through the steel angles at the edges, the **hand-holes** to these bolts then being filled and stopped with concrete.

The panels or units (usually 2ft. 8in. to 4ft. 6in. wide by 10ft. or 11ft. high) according to standards or uprights, being completely erected, the concrete walls or partitions are then rendered with a coat of cement together with a water-proofing composition to give a finished appearance to the structure. This may be smooth or with a rough cast coating.



Herringbone Expanded Metal has the longitudinal rib set on edge at an angle of 45 degrees to give rigidity, the **diagram shows** the channel uprights, 16in. centre to centre. In the heavier lathing, 20in. centres are used.

The **selvedge edges** of this lathing interlock, and form a strong even jointed lap. It is important both sides of metal framing and lathing.

N.B.—Iron framing should be well covered with **cement** plaster to exclude the air. **Not** lime mortar, which corrodes and eats.

COKE BREEZE PARTITION BLOCKS.

	Fixed net Material per yd.			
	s.	d.	s.	d.
2½in. thick per square yard	3	6	7	6
3in. thick	4	0	8	6
4in. thick	5	0	10	6
4½in. thick	6	6	12	0

Generally in building blocks of 18in. x 9½in. high, compressed to work " bond " with brickwork.

Labor and cement, per sq. yard, from 2/6 to 5/6 per sq. yd. fixed and finished both sides. (*See Pantiling, Constant of Labor*).

Special Lintels for breeze block partitions, 2 courses, 10d.; 3 courses, 1/–.

	s.	d.
Terra Cotta Lumber, 12 x 6 x 2in. thick, weight 104lbs. per sq. yard	...3	3
Ditto blocks, 15 x 9¾ x 3in. thick, weight 130lbs. per sq. yard	...3	6
Ditto, 15 x 9¾ x 6in. thick, weight 240lbs. per sq. yard ...	...5	6

PLUMBERS' WORK.

GALVANISED IRON.

Measurements.

Lead work is usually charged by the lb. or cwt.

Close copper nailing and overlaps, soldering to joints, by the ft. run.

Water and Gas pipes by the ft. run.

Gas and Water fittings by the number of points of exit.

Galvanised Corrugated Iron Roofing and Ceilings by the square or 100 super. ft.

In measuring eaves gutters, for every angle reckon 3ft. extra of gutter, or else add the price of the angles separately.

Valley and Ridge capping should be at least 24 gauge, although 22 gauge would be better still.

Gal. Iron will last at least seven years without painting. If painted, non-poisonous paints should be used if the rain water is utilised for drinking purposes. Oxide of iron paints preserve.

GALVANISED CORRUGATED IRON.

Made in sheets 4½ft., 5ft., 6ft., 7ft., 8ft., 9ft., and 10ft. long by 2ft. 3in. wide, with 3in. corrugations, or 2ft. wide with a lap of one corrugation, which is sufficient for fences ; but a lap of two corrugations is required for ordinary roofs, with an end lap of at least 6in.

WEIGHT AND COVERING CAPACITY OF GAL. IRON.

Per square of 10ft. x 10ft.	Gauge. 24 lbs.	26 lbs.
Lapped 2 corrugations	180	130
Lapped 1 corrugation	150	110
One ton of iron will cover—		
7ft. sheets cover, 2 sheets span, 6in. centre lap and 2 corrugations, making covering 13ft. 6in. x 1 ft. 9in. wide	Squares 14.20	18.86
2 cases of 10 ft. sheets, 1 sheet span, will cover	15.60	19.60
Squares per ton, lapped 1 corrugation ...	15.00	20.36
Ditto. do. lapped 2 corrugations ...	12.44	17.23

This calculation is made from the average number of 5ft. and 6ft. sheets per ton, reckoning five of each for single lap, and six of each for double lap, and 12in. for end laps per square.

One packet of Spring Head Nails (100) is usually allowed to one square of roofing.

GAL. CORRUGATED IRON SKYLIGHTS.

6ft. to 10ft. sheet, 30/– to 35/– ; opening skylight, 37/– to 42/– ; glazed mill rolled glass.

Add labor for fixing skylights, 10/– each.

If wages or material alter in price, add or deduct.

See advt., p. 29.

GAL. CORRUGATED IRON (24 gauge).

Approx. price per Sheet per half ton case.

Price per Case.	Length of Sheets.				
	5ft.	6ft.	7ft.	8ft.	10ft.
£ s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
12 10 0	3 0	3 7	4 2	4 9	6 0
13 0 0	3 2	3 9	4 4	4 11	6 2
13 10 0	3 3	3 10	4 6	5 1	6 5
14 0 0	3 5	4 0	4 8	5 3	6 8
14 10 0	3 6	4 2	4 10	5 6	6 11
15 0 0	3 7	4 4	5 0	5 8	7 2
	26 Gauge.				
12 10 0	2 2	2 6	3 0	3 5	4 4
13 0 0	2 3	2 8	3 2	3 6	4 6
13 10 0	2 4	2 9	3 3	3 8	4 8
14 0 0	2 5	2 10	3 4	3 10	4 10
14 10 0	2 6	2 11	3 6	3 11	5 0
15 0 0	2 7	3 1	3 7	4 1	5 2

Sheets in ½ ton case.	5ft.	6ft.	7ft.	8ft.	9ft.	10ft.
24 gauge ...	83	70	60	51	45	41
26 ,, ...	116	97	83	73	64	57
28 ,, ...	133	113	95	83	75	70

"Armco" Rust Resisting, 26 gauge, £45 per ton, in cases.

CEILING IRON (I in. Corrugations).

£31 15s. per ton.

Lengths ...	5ft.	6ft.	7ft.	8ft.	9ft.	10ft.
Sheets in case, 26 g. ...	122	99	86	75	67	60

See advt., pp., 2, 10, 23, 24, 29.

GALVANISED CORRUGATED IRON.

Labor only, per square.	s. d.
Present wages of Plumber, per hour, 2/9.	
Hip roofs, covered with corrugated gal. iron, 24 to 26 gauge, double laps	9/– to 10 0
Gable roofs, do. do.	7/6 to 9 0
Ditto, no cutting, and 4 sheets run flat roofs ...	6/– to 8 0
Balcony, verandah, curved roofs	10/– to 15 0
Small corrugated sheets, ceilings	10 0
Fences, 6ft. sheets, screwed, bottom, top, middle, and sides of sheets	6 0
Ordinary mixed roof hips, valleys, gables, average	9 0
Curving Galvanised Corrugated Iron, per sheet 6d. to 1/–.	

Present Contract Prices, per square, fixed—	£ s. d.
Corrugated iron roofs, 24 gauge	2 15 0
Corrugated iron roofs, 26 gauge	2 3 0
Corrugated ceilings, small section, 26 gauge	2 11 0
Gal. iron hips and ridges and valleys, per ft. run ...	0 1 6

PLAIN GAL. SHEET IRON.

Price per ton	24 gauge 24in. wide	24 gauge 30in. wide	24 gauge 36in. wide	26 gauge 24in. wide	26 gauge 30in. wide	26 gauge 36in. wide	28 gauge. 24in. wide	28 gauge. 30in. wide	28 gauge. 36in. wide
£25	2 10	3 6	4 3	2 1	2 7	3 2	1 9	2 3	2 8
£26	2 11	3 8	4 5	2 2	2 9	3 3	1 10	2 4	2 10
£27	3 1	3 10	4 7	2 3	2 10	3 5	1 11	2 5	2 11
£28	3 2	4 0	4 9	2 4	2 11	3 6	2 0	2 6	3 0
£29	3 3	4 1	4 11	2 5	3 0	3 7	2 1	2 7	3 1
£30	3 5	4 3	5 1	2 6	3 2	3 9	2 2	2 8	3 3
Sheets in case	89	70	59	120	98	80	140	112	88

Gutter Brackets, short tail, 2/3 ; long tail, 3/– ; overstraps, 2/– per doz. ; astrigals, 7/6 per doz. ; stop ends, 10d. each.

Gal. iron screws, $1\frac{3}{4}$ x 12 gauge, 95/– cwt., 1/– lb. ; 2 x 12 gauge, 120/– cwt., 1/2 lb.

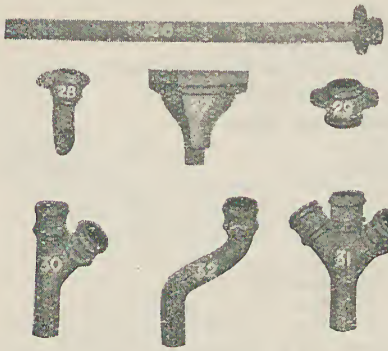
Gal. cone head bolts and nuts, $\frac{1}{2}$ x $\frac{7}{32}$, 4/6 gross, 6d. doz. ; spring head nails, plain shank, 80/– cwt. or 9½d. lb. ; twisted, 100/– cwt., 1/– lb. ; awning hooks for T and angle iron, gal., 1/9 doz. ; awning clips, 1/6 doz.

Corrugated iron sheeting bitumen coated both sides, 24 and 26 gauge, suitable for roofs in seaside districts.

See agent's advt., p. 13.

MALLEABLE CAST IRON RAINWATER PIPE.

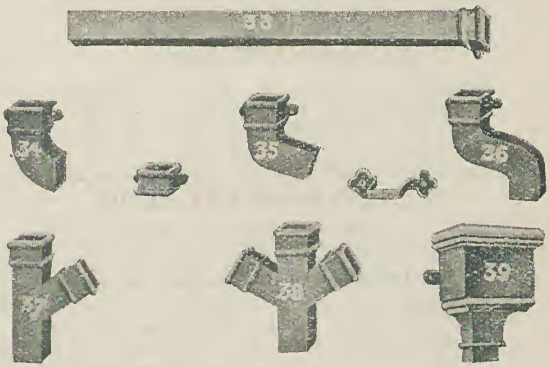
	Size Dia. 2in. s. d.	2½in. s. d.	3in. s. d.	4in. s. d.
Fig. 26 6ft. Lengths ...	7 6	8 6	9 6	11 6
4ft. Lengths ...	6 0	6 9	7 6	9 6
3ft. Lengths ...	5 6	6 0	6 6	8 6
2ft. Lengths ...	5 0	5 6	5 9	7 6
Fig. 26A Bends ...	2 6	3 3	4 0	5 6
Fig. 27 Heads	5 9	6 0	6 3	6 6
Fig. 28 Shoes	2 3	2 6	3 0	5 6
Fig. 29 Sockets	1 3	1 6	1 9	2 3
Fig. 30 Single Junctions	3 6	4 6	5 6	7 6
Fig. 31 Double Junctions	6 0	6 3	7 0	10 9
Reducing Sockets	—	—	3 0	3 6
SWAN NECKS OR OFF-SETS—				
3in.	3 3	3 6	3 9	6 9
4½in.	3 6	3 9	4 0	7 0
6in.	3 9	4 0	4 3	7 3
9in.	4 9	5 0	5 6	7 9
12in.	5 0	5 6	6 0	8 3
18in.	6 6	7 6	8 6	9 6
21in.	7 0	8 0	8 9	14 0
24in.	7 3	8 6	9 3	14 6



Labor, fixing, with putty, 6d. per foot and joints, 6d. to 9d. ; lead joints, 9d. to 1/6 each.

CAST IRON GUTTERING—

	each
Gutter 6ft. long	8 0
Socket or Spigot Stop Ends	0 6
Square Angles, Obtuse Angles, R. & L. hand T. Pieces ...	2 3
Nozzle Pieces with 1 or 2 Sockets, 2/6 ; Drop Ends for Spigot or Socket Ends	2 0
Union Clip, 1/3 ; Cast Facier Brackets, –/9 ; W.I.Driving Bracket, 1/2 ; W.I. Hanging Bracket	0 9



SQUARE RAINWATER PIPES AND FITTINGS—

	each	4 x 3	4 x 4	5 x 4	6 x 4
Fig. 33 Piper, 6ft. lenghts		18 0	19 0	24 0	27 0
Fig. 34 Shoes		11 0	11 3	11 3	11 6
Fig. 35 Bends		11 6	11 6	12 0	12 6
Fig. 36 Offsets, 3in. ...		11 6	12 0	12 6	13 0
,, 4½in. ...		11 9	12 3	12 9	13 3
,, 9in. ...		—	14 0	—	—
Union Sockets		3 3	3 6	4 0	4 6
Loose Ears ...		2 9	2 9	3 0	3 0
Fig. 39 Heads		26 0	27 0	39 0	29 0

Figs. 37, 38 Branches—On application.

CAST IRON SQUARE R.W. PIPE.

Prices, see advt., pp. 23, 29.

Footpath Boxes, 4/9 each ; Inspection Boxes, 3/- each .
Sink Stands, 15in. to 24in., 17/6 to 18/6 each.

Water Grates. and Discs.

	Sq.	Rd.	Rd. Water with Holes		Sq.	Rd.	Rd. Water with Holes
	ea.	ea.	ea.		ea.	ea.	ea.
4in. ...	0 7	0 7	—	10in. ...	3 8	2 6	2 0
5in. ...	0 8	0 9	—	11in. ...	3 10	4 0	—
6in. ...	0 11	0 11	0 9	12in. ...	5 0	5 0	—
7in. ...	1 1	1 1	1 0	14in. ...	6 3	—	—
8in. ...	1 5	1 2	1 4	16in. ...	7 6	—	—
9in. ...	2 3	2 0	1 6	18in. ...	10 3	—	—

GAL. IRON DOWN PIPE (Round).

Length dia.	28G. 6ft.	28G. 8ft.	26G. 6ft.	26G. 8ft.	24G 6ft.	24G 8ft.
2in. ...	1 1	1 5	1 2	1 7	1 7	2 1½
2½in. ...	1 2½	1 7½	1 3½	1 9	1 10	2 5½
3in. ...	1 4½	1 10	1 6½	2 0½	2 1½	2 10
3½in. ...	1 7	2 1½	1 9	2 4	2 5½	3 3½
4in. ...	1 10	2 5½	2 0½	2 8	2 10	3 9½
5in. ...	2 4½	3 2½	2 6½	3 5	3 5½	4 8
6in. ...	2 8½	3 7½	3 0½	4 0	4 0	5 4

G.I. DOWN PIPE (Square).

Lengths	6ft.	6ft.	6ft.
3in. x 2in.	1 8	1 10	2 4½
4in. x 2in.	1 11½	2 1½	2 8½
4in. x 3in.	2 2½	2 4½	3 1½
4in. x 4in.	2 4½	2 7½	3 6½

GAL. IRON DOWN PIPE HEADS.

2in.	2½in.	3in.	3½in.	4in.
7 0	8 0	8 6	9 6	10 6

GAL. IRON GUTTERING, O.G. or Quod.

Lengths	28G. 6ft.	28G. 8ft.	26G. 6ft.	26G. 8ft.	24G. 6ft.	24G. 8ft.
4in. ...	1 2½	1 7	1 4½	1 10½	1 10 ½	2 5½
4½in. ...	1 3½	1 8½	1 5	1 11	1 11½	2 7
5in. ...	1 5	1 11	1 7	2 1½	2 1½	2 10
6in. ...	1 7½	2 2	1 10½	2 5½	2 5½	3 3½

Labor Fixing, 1/- to 2/-

ANGLES, O.G. or Quadrant.

	28G.	26G.	24G.
4in. ...	1 6	1 8	2 0 each
4½in. ...	1 9	1 11	2 3
5in. ...	2 0	2 2	2 6
6½in. ...	2 3	2 5	2 9

RIDGING.

12in.	...	1	7	2	1½	1	8	2	3	2	3½	3	1
14in.	...	1	9	2	4½	1	11½	2	7	2	7½	3	6
15in.	...	1	11½	2	7	2	1½	2	10	2	10	3	9
16in.	...	2	0½	2	9	2	2½	2	11½	3	0	4	0
18in.	...	2	3½	3	1	2	5½	3	3½	3	4	4	6
20in.	...	2	6½	3	5	2	9	3	8	3	8½	4	11

Louvres, Galvanised, Stamped Pattern, 9/– doz.

Pipe (Vent), 4in. x 18G., per 6ft. length, 7/6.

Labor, fixing, from 4d. to 8d. per foot.

VENTILATING COWLS.

Shaft Inches	2	3	4	6	9
Sewerage Cowls, approved	1 9	2 7	2 11	7 0	12 6
Down-Draft Cowl	4 6	5 9	7 0		
Mica Induct			5 0		

Inches	6	9	10	12	15	18
Rainproof Cowls ...	15 6	21 6	23 6	27 0	38 6	52 6
Revolving Cowls, Malt House					7-inch	15 0
,, ,, Lobster Back					7-inch	25 0
Breach's Sizes	6in.	9in.	12in.	15in.	18in.	24in.
Patent Cowls ...	25 9	33 9	47 0	70 0	85 0	150 0

Iron Stays, per set for above, 4/6.

Zinc Ventilating Cowls Princeps Pat.

	each		each
4in. shaft	25 0	12in. shaft	55 0
5in. ,, ...	31 0	15in. ,, ...	75 0
9in. ,, ...	45 0	18in. ,, ...	120 0

Labor, fixing, from 1/6 to 4/– each.

Labor only—Downpipes, Gal. Iron, Gutterings (according to size and gauge)—

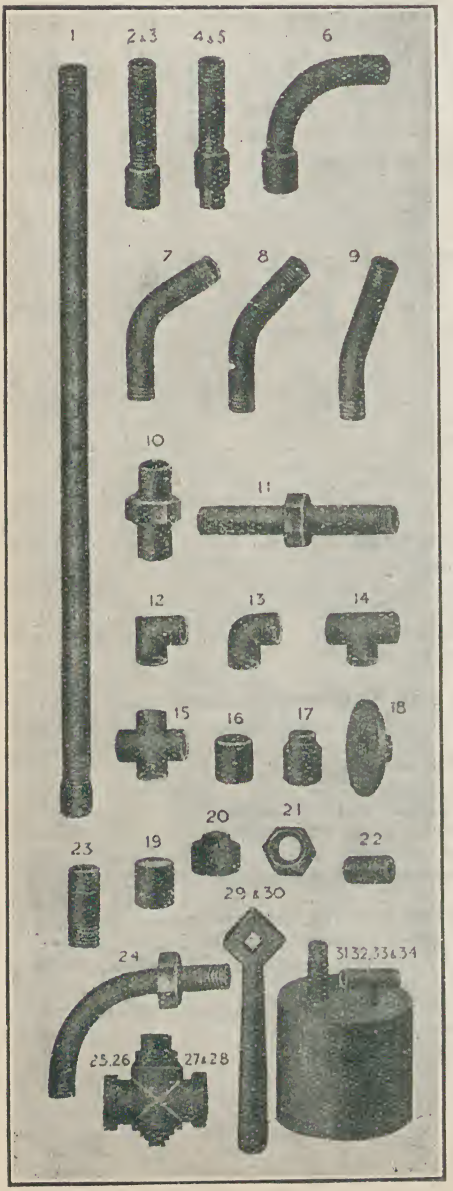
	s. d.		s. d.
Fixing down pipe, including solder, per foot ...	0 3	to	0 8
Fixing spouting or eaves, guttering, per foot ...	0 4	to	0 8
Fixing plain sheet gal. iron on partitions, advt. hoardings, nailed around edges with clouts 4ft. apart, per square	10 0	to	15 0
Fixing ridges, including screws and washers, per 6ft. length	1 6	to	2 6

24 G. Galvanised Iron Tanks, fitted with Tap and Overflow—

200 gal., weight 90lbs., 54/–; 400 gal., weight 142lbs., 97/–; 600 gal., weight 185lbs., 105/–; 800 gal., weight 214lbs., 120/–; 1000 gal., weight 256lbs., 134/–.

Material only—400 gal., 63/–; 600 gal., 73/–; 1000 gal., 92/–; 1500 gal., 125/–; 3000, £9 16s.

Tank rivets and washers, 1/3 to 1/5 per lb.



WROUGHT IRON TUBES

PRICE

Discount off

Internal Diameter in inches.

TUBES	
Tubes, 2 feet long and over	per foot
Pieces 12 to 23½ inches long	each
Pieces, 4 to 11½ inches long	,,
Long Screws, 21 to 23½ inches	,,
Long Screws, 3 to 11½ inches	,,
Barrel Nipples	,,
Bends	,,
Springs, not socketed ...	,,
FITTINGS	
Socket or Pipe Union ...	each
Elbows, Square	,,
Elbows, Round	,,
Tees	,,
Crosses	,,
Sockets, Plain, or Plugs ...	,,
Sockets, Diminished ...	,,
Flanges	,,
Caps	,,
Backnuts or Nipples ...	,,
Union Bends	,,
Main Cocks	,,
Main Cocks, with Plugs ...	,,
Round Way Cocks	,,
Round Way Cocks & Plugs...	,,
Cock Spanners, Wrought ...	,,
Syphon Boxes, 1 quart ...	,,
Syphon Boxes, 2 quarts ...	,,
Syphon Boxes, 3 quarts ...	,,
Syphon Boxes, 4 quarts ...	,,

AND FITTINGS FOR GAS, WATER AND STEAM

LIST.

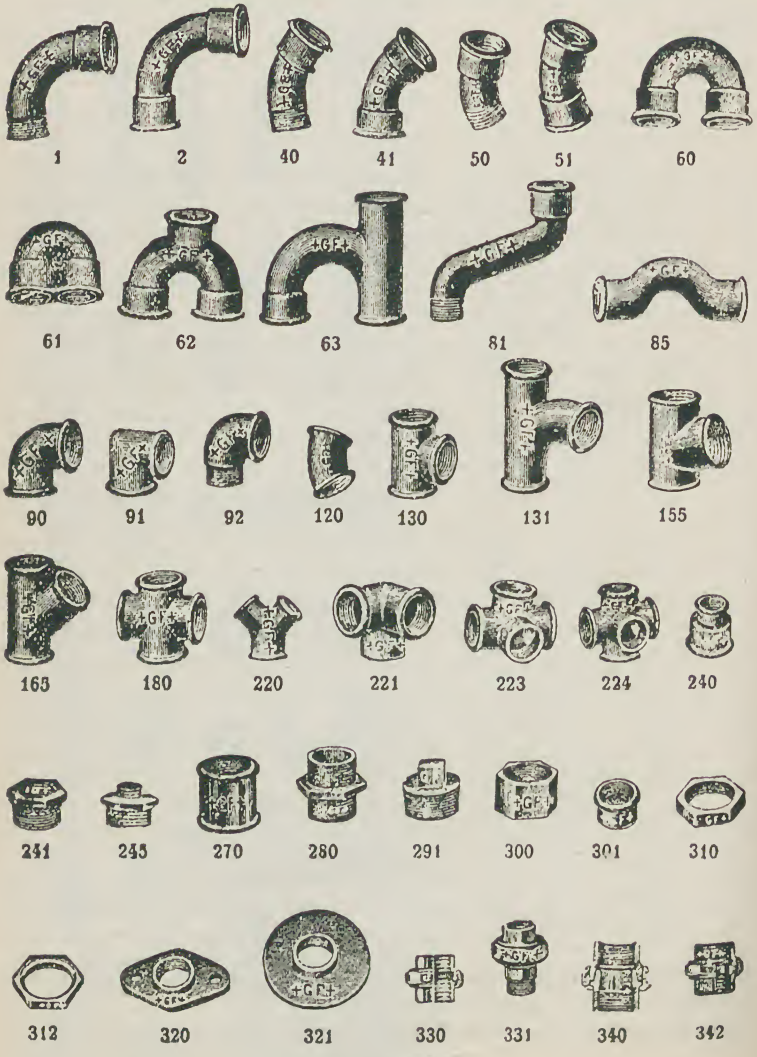
Fluctuates.

No.	⅛&¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	4	5	6
1	-/4	-/4¼	-/5½	-/6¾	-/9¼	1/1	1/4½	1/8	1/10	2/10	3/3	4/5	6/-	7/6
2	-/10	-/11	1/1	1/5	1/11	2/8	3/4	4/6	4/9	8/-	10/6	15/6	24/-	32/6
3	-/7	-/8	-/9	-/11	1/3	1/8	2/2	2/10	3/-	5/3	6/9	10/9	18/-	25/3
4	-/11	1/-	1/3	1/7	2/2	2/10	3/9	5/-	5/3	9/-	12/-	17/-	26/6	35/6
5	-/8	-/9	-/10	1/1	1/5	1/11	2/6	3/3	3/6	6/6	8/6	13/-	20/-	28/-
23	-/5	-/5	-/6	-/7	-/9	1/-	1/4	1/8	1/9	3/-	4/-	7/-	12/6	20/-
6	-/8	-/9	-/11	1/2	1/7½	2/7½	3/2	4/2	5/2	12/-	18/-	32/6	105/-	150/-
7, 8, 9	-/5	-/6	-/7	-/9	1/11½	1/11½	2/3½	3/1	3/11	9/6	14/6	26/6	93/-	132/-
10, 11	2/-	2/6	3/-	4/-	5/6	6/9	8/-	9/-	10/-	17/6	22/6	35/-	66/-	105/-
12	-/10	-/11	1/1	1/3	1/6	2/2	2/7	3/4	4/3	9/6	14/-	28/-	91/-	150/-
13	-/11	1/-	1/2	1/5	1/8	2/4	2/10	3/9	3/8	10/6	16/-	30/-	95/-	150/-
14	1/-	1/1	1/3	1/7	1/10	2/6	3/1	4/2	5/1	11/6	18/-	32/-	98/-	155/-
15	3/2	2/4	2/9	3/3	4/1	5/6	6/7	8/6	10/6	22/-	40/-	66/8	220/-	350/-
16	-/3	-/3	-/4	-/5	-/6	-/8	-/10½	1/1	1/3	2/6	3/6	6/-	12/-	18/-
17	-/4	-/5	-/6	-/7	-/9	1/-	1/4	1/9	2/-	5/-	7/-	11/-	35/-	55/-
18	/9	-/10	1/-	1/2	1/4	1/9	2/-	2/3	2/9	5/-	8/6	11/6	18/-	27/-
19	-/3½	-/3½	-/5	-/6	-/8	1/-	1/3	1/7	2/-	4/4	6/-	10/6	30/-	45/-
21	-/2	-/2	-/3	-/3½	-/5	-/6	-/8	-/10	1/1	2/3	3/6	5/6	18/-	26/-
24	2/6	3/-	3/9	5/-	6/3	8/6	10/-	11/6	13/6	27/-	37/-	58/-	100/-	160/-
25	1/6	1/9	2/3	2/10	4/2	5/4	7/-	11/6	11/6	17/6	26/-	47/9	125/-	165/-
26	—	3/4	4/-	5/4	7/6	10/-	13/-	21/-	21/-	40/-	50/-	100/-	225/-	325/-
27	—	2/7½	3/-	4/1½	5/7½	7/6	9/9	13/1½	16/6	45/-	56/3	120/-	—	—
28	—	7/10½	9/-	12/4½	16/10½	22/6	29/3	39/4½	49/6	135/-	168/9	360/-	—	—
29	—	1/1½	1/3	1/7½	2/-	2/4½	2/7½	3/-	3/3	4/6	6/9	10/6	11/3	18/-
31	—	—	22/9	23/-	23/4	24/-	24/6	25/2	26/3	—	—	—	—	—
32	—	—	—	17/-	27/4	28/-	28/6	29/2	30/3	35/6	42/6	—	—	—
33	—	—	—	32/-	32/4	33/-	33/6	34/2	35/3	40/6	47/6	61/6	—	—
34	—	—	—	38/-	38/4	39/-	39/6	40/2	41/3	46/6	53/6	67/7	—	—

1926 Discount off Trade List: Black 30%; Gald. 20%; Steam 20%. Black Tubes to 3in. 50%; Gald. Tubes 46¼%; Steam Tubes 25%.

1926 Premium on Trade List: Black Tubes, over 3in. 5%; Gald. 15%; Steam 15%.

MALLEABLE CAST IRON PIPE FITTINGS.



(See Advt., page 7.)

MALLEABLE TUBE FITTINGS.
Black Less 25% ; Gal. less 15%.

Internal Diam. in In.	No.	¼	⅜	1	1¼	1½	2	2½	3	4
Bends 90°	1	1/1½	1/6	2/3½	3/6	5/-	7/6	14/-	21/-	42/-
,, 90°	2	1/2½	1/8½	2/6	3/10½	5/6	8/3½	15/4½	23/-	46/-
,, 45°	41	1/-	1/4½	2/-	3/2½	4/6	7/-	13/-	18/4½	37/-
Return Beads ...	60	1/7¼	2/4½	3/4½	4/9½	6/-	10/6	17/-	24/-	50/-
Offsets	81	2/-	2/9½	4/-	5/4½	6/2½	9/4½	16/6	27/-	—
Elbows, Round ...	90	-/9½	1/2½	1/8½	2/7¼	3/6	5/-	9/-	14/-	24/-
,, Street ...	92	-/10½	1/3½	1/10½	2/9½	3/9½	5/6	10/-	16/-	27/6
Tees	130	1/-	1/4½	2/-	2/9½	4/-	5/6	10/-	16/-	27/6
,, Sweep ...	131	1/6	2/4½	3/7¼	3/-	7/-	10/-	19/-	32/-	55/-
Crosses, Y Pieces & Angle Pieces ...	221	1/4½	2/2½	2/10½	4/4½	6/-	8/-	15/-	24/-	40/-
Double Tees ...	223	1/9½	2/7¼	3/7¼	5/-	7/-	9/6	—	—	—
Reducing Sockets ...	240	-/6½	-/9	1/-	1/6	2/-	3/-	4/9½	7/8½	13/-
Reducers	241	-/6	-/8	-/10½	1/4½	1/9½	2/8½	4/6	7/-	12/-
Hex. Red. Nipples	245	-/7¾	-/10½	1/1½	1/9½	2/4½	3/6	5/9½	9/6	16/6
Sockets, Fluted ...	270	-/5½	-/7½	-/10½	1/3½	1/9½	2/7½	4/4½	7/-	12/-
Hex. Nipples ...	280	-/7¼	-/9½	1/-	1/7¼	2/2½	3/2½	5/4½	8/7½	15/-
Plugs, Plain ...	291	-/3½	-/6	-/8	1/-	1/4½	1/10½	3/3½	5/-	9/-
Caps, Round ...	301	-/4½	-/7½	-/9½	1/2½	1/9½	2/3½	4/-	6/-	11/-
Nuts	310	-/3½	-/4½	-/5½	-/7½	-/10½	1/5½	2/1½	3/4½	6/-
Flanges, Oval ...	320	1/1¼	1/8½	2/2½	3/-	3/6	4/1¼	5/8½	8/-	12/-
,, Round ...	321	1/4½	2/-	2/2½	2/9½	3/6	4/6	7/-	9/-	12/6
Hex. Unions ...	330	2/4½	3/-	3/7¼	4/9½	6/4½	9/-	16/-	26/-	50/-
,, ,, ...	340	2/10½	3/7¼	4/4½	5/9½	7/9½	11/-	19/6	31/6	60/-
,, ,, ...	342	5/-	6/-	7/-	9/-	12/-	16/6	30/-	46/-	—

RAILING FITTINGS.
Steam Railing less 10%.

Int. Dia. in In.	ea.	¾	1	1¼	1½	2
Elbows	660	1/4½	2/-	3/3½	4/-	6/-
Angles	661	1/9½	2/6	4/-	5/7½	7/7½
Tees	662	1/6	2/2½	3/8½	4/7¼	6/7¼
D. Tees, Crosses	663	1/10½	3/-	4/6	6/-	7/9½
D. Crosses	665	2/3½	3/3½	5/-	6/6	8/-
Elbows	667	2/1¼	3/-	4/6	5/6	7/6
Tees	669	2/6	3/6	5/6	7/-	9/-

Int. Dia. in In.	ea.	¾	1	1¼	1½	2
Crosses	672	2/9½	4/-	6/-	7/6	9/6
Elbows	700	6/-	7/6	10/-	—	—
Tees	703	7/-	9/-	12/-	—	—
Crosses	705	8/-	10/-	14/-	—	—
Knobs	730	1/6	2/-	2/6	4/-	5/-
Soc't Plates	732	1/9½	2/6	3/-	4/-	5/6
Reducers	734	-/9½	1/1¼	1/7¼	2/-	3/-

MALLEABLE FITTINGS TRADE LIST.

	⅛in. & ¼in.		⅜in.		½in.		¾in.		1in.		1¼in.		1½in.		2in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Elbows, M. & F.	0	5	0	7	0	9	1	1	1	6	2	1	2	7	4	2
Do., Female	0	4½	0	6	0	8	0	11	1	4	1	10	2	3	3	6
Tees ...	0	5	0	7	0	9	1	1	1	6	2	1	2	7	4	2
Sockets, Pl.	0	3¼	0	3½	0	4¾	0	6½	0	8½	0	11½	1	3½	1	11
Sockets Red	0	3½	0	4	0	5½	0	7½	0	10	1	2	1	6	2	3
Flanges ...	0	8	0	10	1	0	1	4	1	8	2	0	2	4	3	1
Caps ...	0	2½	0	3	0	4	0	6	0	8	0	11	1	3	1	11
Plugs ...	0	1½	0	2	0	2½	0	4	0	5½	0	7½	0	10	1	2
Backnuts	0	1¾	0	2¼	0	2½	0	3½	0	4	0	5½	0	7½	0	11½
Hex. Nipples	0	3½	0	3¾	0	5¼	0	7¼	0	9½	1	4	1	8	2	6
Bushes ...	0	3	0	3	0	4	0	6	0	8	01	1	1	2	—	
Bends ...	—		—		0	10	1	1	1	8	2	10	4	0	—	

Discounts 1926 : Gald., less 27½% ; Black, less 40%.

Wages Award, 2/9 ; Laborer, at 2/4½ per hour.

WATER AND GAS PIPES.

Material and Labor, including Tees, Elbows, complete.

Pipes. inside dia.	Approx. Labor per ft.	per ft. run Water	per ft. run Gas	Fixed Water	Fixed Gas
	s. d.	s. d.	s. d.	s. d.	s. d.
½in.	0 5	0 2¾	0 2½	0 7¾	0 7½
¾in.	0 6	0 3¾	0 3⅝	0 9¾	0 9⅜
1 in.	0 8	0 5	0 4⅝	1 1	1 0⅝
1¼in.	1 0	0 7½	0 6¼	1 7½	1 6¼
1½in.	1 6	0 9	0 8¼	2 3	2 2¼
1¾in.	2 0	0 10½	0 9¼	2 10½	2 9¼
2 in.	2 6	1 0	0 11	3 6	3 5
2½in.	3 0	1 6	1 4	4 6	4 4

The number of bends, junctions, cuts, or short lengths increase the cost.

Labor and Materials connecting water to main service (exclusive of W. & S. Board main fittings), including opening ground, boring main, cutting through and making good to walls, floors, &c.

Laying on Gas in the Cities.

Connecting with meter, including all necessary pipes, T. and angle pieces, cocks, &c., fixed to receive lights, at per point or connection, average cottage work ... ... s. d. 25 0

The Sydney and North Sydney Gas Company supply and lay service pipe from the main to meter.

In laying gas-pipes through floors, the **centre of the joists** should not be cut away, because the joists are weakened in proportion to the depth cut away, whereas the ends of the joists (to one-eighth of the span) may be cut away to one-third of their depth, or at one-quarter of the span, to one-sixth of their depth, without in any way weakening them.

Sydney W. & S. Board regulation **size** of pipe permitted, ½ inch gal. iron water pipe for branch service supplying one shower-bath, one lavatory-basin, or one water-closet, urinal, or slop-sink cistern, where the branch pipe does not exceed 7 feet, and the service is directly connected to the Board's water main.

All other iron pipes used for water services shall not be less than ¾ inch internal dia.

EXCAVATION ONLY.

Labor.

For Plumber's Pipes and Filling in same, per yard run.

	s. d.	s. d.
12in. to 2ft. deep, general excavation, from ...	0 6 to	1 0
3ft. deep x 12in. wide	...	1 6
Ditto, extra, through blue metal road, 12in. ...	...	1 9
Ditto, extra, through soft sandstone rock, 2ft. deep	...	2 0

BRASS STOP COCKS (W. and S. BOARD) (Tested).

Price, Fixed, Complete.

	s. d.	s. d.		s. d.	s. d.
¾in., each ...	4 0	5 0	1¼in., each ...	20 0	22 0
1in. ,, ...	10 6	12 0	1½in. ,, ...	27 0	29 0

Nickled plated, add 2/– to 3/– extra.

BRASS TUBING.

Including all Fittings, per ft. run, fixed.	s. d.
⅝in. diameter	1 0
½in. diameter	0 11
⅜in. diameter	0 10

COPPER TUBING.

To comply with W. & S. Board's By-laws.

Whitworth Standard Gas Thread, Outside Diameter, Gauges and approx. Weights per foot of Copper Tubes for Hot and Cold Water Supply.

Gas Screwing	Outside Dia.	Gauge	Price per lb.	Approx. Wt. per foot.
inch	inch		s. d.	
½	13/16	16	2 0½	9½ozs.
½	13/16	14	1 11½	12ozs.
¾	1 1/32	16	1 11½	12ozs.
¾	1 1/32	14	1 11	14ozs.
1	1 5/16	16	1 11½	15½ozs.
1	1 5/16	14	1 10½	1lb. 2ozs.
1	1 5/16	12	1 10½	1lb. 7ozs.
1¼	1 5/8	16	1 11½	1lb. 5ozs.
1¼	1 5/8	14	1 10½	1lb. 8ozs.
1¼	1 5/8	12	1 10½	2lb.
1½	1 7/8	14	1 10½	1lb. 12ozs.
1½	1 7/8	12	1 10½	2lb. 4ozs.
2	2 5/16	14	1 10½	2lb. 2ozs.
2	2 5/16	12	1 10½	2lb. 14½ozs.

Cut lengths, 1d. lb. extra. Special price for 500 feet and over.

SPECIAL FITTINGS FOR COPPER MAIN CONNECTIONS.

Water and Sewerage Board's By-law.

Per doz.

	½in.	¾in.	1in.	1¼in.	1½in.	2in.
Heavy Brass Sockets	7 0	10 0	16 6	23 9	37 6	48 6
Heavy Brass Adaptors or Main Nose Pieces	10 9	12 0	14 6	22 6	37 6	48 6
Copper Bends, with 2½in. radius ...	—	23 9	—	—	—	—

HIGH PRESSURE WATER FITTINGS.

Stamped and Tested by Sydney Water Board.

Dia.	½in.	¾in.	1in.	1¼in.	1½in.	2in.
Bib Cocks, brass polished	3 9	4 0	10 6	20 0	27 0	47 0
Ditto, nickel plated	5 0					
Pillar Cocks, Hot or Cold	6 6					
Cross Head, Bib Cocks, N.P.	7 0	7 9	15 9			
Ditto, Stop Cocks, N.P.	7 7	10 8	16 3			
Hose Cocks	5 0	6 0	13 0	24 0	32 0	54 0
Shower Cocks, rough	4 0	6 0	10 0	17 6	22 6	42 0
Ditto, polished ...	4 6	6 9	10 9	19 0	24 6	45 0
Meter Cocks, ...			7 3			
Cistern Cocks, straight union	6 6					
Elbowing, 7/-						
Path Cocks		7 6	9 6	16 0	21 6	37 0
Unions, T. & S. ...		3 3	4 0	5 9	8 3	12 3
Ferrule Cocks, straight cap and lining ...		8 0	10 6			
Ditto, with Elbow Union		10 0	14 0	16 0	18 0	

See Manufacturer's advt. at p. 8.

PALAZZI PATENT GULLY GRATES AND RISES.

	Each		
	2in.	2½in.	3in.
Traps, Palazzi, Outlet	14 0	15 6	20 6
Gully Tops, Palazzi ...	...Single, 12/-	Double, 14/-	
Sleeves, Plain	3 0	3 9	4 6
Sleeves with C.E.	11 6	13 6	15 0
Sleeves with C.E. and 2in. vent ...		18 0	18 6
	6in.	9in.	12in.
Risers with Gratings	9 6	12 6	15 6
Riser Extensions	7 0	8 0	12 0

SANITARY BRASSWARE LIST.

	Each. s. d.
1½in. Junctions, I.O., 7/-; Plain	4 9
Sanitary Elbows, 1½in. 85 I.O.	4 0
,, ,, 2in. 85 I.O.	5 6
,, ,, 2in. 85 Junctions	7 0
,, ,, 2in. x 1½ x 85 Junctions, I.O.	7 0
2in. S. Traps I.O.	12 6
1½in. ,, I.O.	9 0
2in. P. Traps, I.O. 9/-; I.O.	9 6
1½in. P. Traps, 6/-; I.O.	7 0

WEIGHT COMPOSITION PIPE.

For Gas Connections, Pneumatic Tubes for Organs and other purposes.

Price, per lb., 9d.

Inside Dia. in.	Outside Dia. in.	Weight per Yard lb. oz.	Inside Dia. in.	Outside Dia. in.	Weight per Yard. lb. oz.
1/4	3/8	1 0	5/8	3/4	1 12
5/16	7/16	1 2	3/4	7/8	2 5
5/8	1/2	1 4	7/8	1-1/32	3 10
1/2	5/8	1 9	1	1-3/16	5 7

WEIGHT PURE TIN PIPES.—Light Gauges.

Price, per lb., 2/10.

Inside Dia. in.	Outside Dia. in.	Approx. Wt. per yd. lb. oz.	Inside Dia. in.	Outside Dia. in.	Approx. Wt. per yd. lb. oz.
1/8	3/16	0 2 1/2	3/4	7/8 bare	1 2 1/2
3/16	1/4	0 3	7/8	1	1 12 1/2
1/4	5/16	0 4	1	1 1/8 bare	1 8
3/8	7/16	0 6	1 1/4	1-7/16	3 8
1/2	9/16	0 11 1/2	1 1/2	1 5/8	3 4
5/8	3/4 bare	1 1	1 3/4	1-29/32	4 3
			2	2-3/16	4 11

LEAD SOIL PIPE.—7lb. Gauge.

In lengths of 10ft. and 12ft.

Inside Diameter	Weight per yard. lbs.	Per ft run. lbs.	Per cwt Approximate ft.	in.
1 1/2	8	2 2/3	42	0
2	10	3 1/3	33	7
2 1/2	13	4 1/3	25	8
3	15	5	22	5
3 1/2	18	6	18	8
4	21	7	16	0
4 1/2	24	8	14	0
5	27	9	12	5

In 10ft. lengths, per cwt., 50/–.

Labor, laying, per cwt., 20/–, according to design.

LEAD WASTE PIPES.—6lb. Gauge.

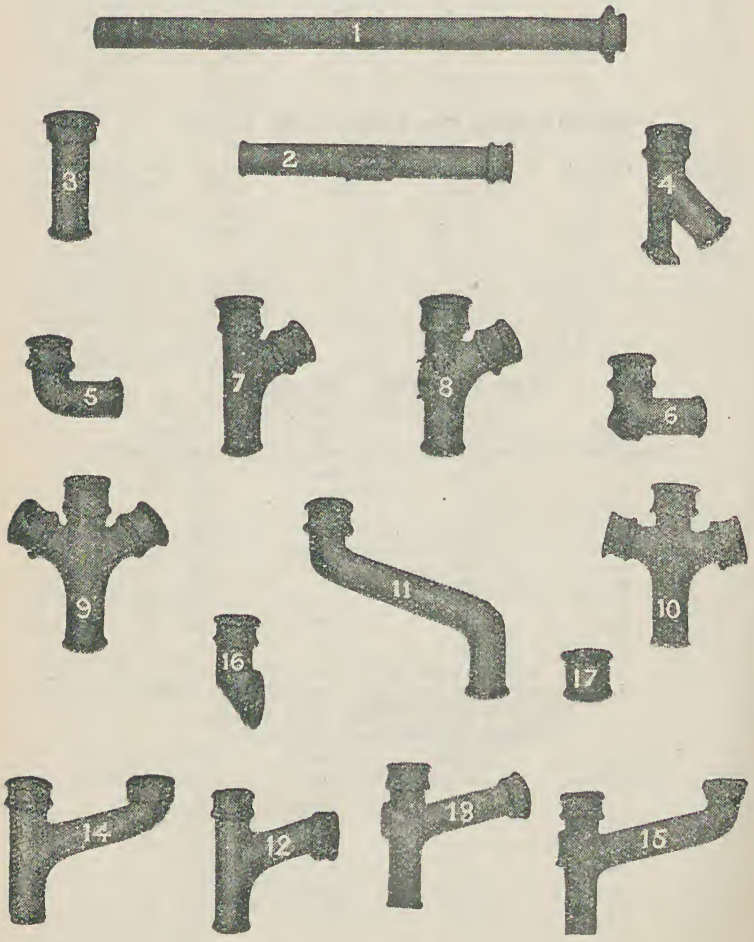
In lengths of 10ft. and 12ft.

Inside Diameter.	Weight per yd. lbs.	Per ft. run. lbs.	Per cwt. Approximate ft.	in.
1 1/2	7	—	48	0
2	9	3	37	4
2 1/2	12	4	28	0
3	14	4 2/3	24	0
3 1/2	16	5 1/3	21	0
4	18	6	18	8
4 1/2	20	6 2/3	16	10
5	23	7 2/3	14	2

In 10ft. lengths, per cwt., 53/–. **Labor,** laying, per cwt., 20/–.

Sanitary Soil Pipe Fittings.

Malleable Cast Iron.



(*See Manufacturers' Advt.* p, 29).

SANITARY SOIL PIPE FITTINGS.

Malleable Cast Iron, 1925.

Fig. 1—Soil Pipes—

	2in.	2½in.	3in.	4in.	5in.
6ft. Socket and Spigot ...	9/–	11/–	12/–	14/6	21/–
4ft. Socket and Spigot ...	6/9	7/9	8/6	11/–	16/–
3ft. Socket and Spigot ...	6/–	7/–	7/6	9/6	12/6
2ft. Socket and Spigot ...	5/6	6/–	6/6	8/6	10/–
6ft. with two Sockets	11/6	13/6	14/6	19/–	26/–
Fig. 2—Inspection Doors fitted on Soil Pipes	4/10	4/10	4/10	11/6	—

Fig. 3—Short Connecting Pieces, in 4in., 9in., 5/–; 12in., 5/6; 15in., 5/9; 18in., 6/–; 22in. x 5in., plain, 13/6; 22in. x 5in., with Door, 27/6.

Bends, with Air Vent, 4in., 9/– each size.

	2in.	2½in.	3in.	4in.
Fig. 4—Bends, with Heels Rests	5/–	5/–	5/6	7/–

	2in.	2½in.	3in.	4in.	5in.
Fig. 5, 6—Bends and Elbows ...	3/2	3/4	4/3	5/8	9/6
Junctions	3/10	5/6	6/–	8/6	—
Fig. 7, 8—Junc., Unequal Branches		7/–	7/6	10/–	16/6
Fig 10—Junction, Inverted ...		—	7/6	10/–	—
Fig 9, 10—Dble Junc, Plain ...		7/9	8/9	10/–	15/6
Dble Junc, Unequal Branches		—	12/–	13/–	18/6
Fig 20—Dble Junc, Inverted ...		—	12/–	13/–	18/6

Fig 11—Swan Necks or Offsets—	2in.	2½in.	3in.	4in.	5in.
3 in projection	3/9	5/–	6/–	8/6	—
4½in. ,, ...	4/–	5/3	6/3	8/9	10/6
6 in. ,, ...	4/6	5/6	6/6	9/–	15/–
9 in. ,, ...	5/6	6/3	7/3	10/–	17/6
12 in. ,, ...	5/9	6/9	7/6	10/6	20/–
15 in. ,, ...	6/–	7/6	8/3	11/6	—
18 in. ,, ...	7/6	8/–	9/–	15/6	—
21 in. ,, ...	8/–	8/6	9/6	16/–	—
24 in. ,, ...	8/6	9/–	10/3	17/–	—
Fig. 21—Syphon Trap	—	—	—	25/–	—
Inspection Door Fitted, extra ...	3/4	3/8	4/3	4/10	5/–

Fig. 12—Projections—	9in.	12in.	15in.	18in.	21in.	24in.
Sanitary Branch for P. Traps, in 4in. only—	12/8	12/10	13/3	13/5	15/–	16/–
Fig. 14—Sanitary Branch for S. Traps, in 4in. only—	15/–	15/6	16/–	22/–	23/–	23/6

Fig. 15—Extra—Inspection Doors fitted to above, each 5/6.

	2in.	2½in.	3in.	4in.	5in.
Fig. 17—Double Sockets	2/2	2/8	2/10	3/5	6/–
Reducing Sockets	—	—	5/–	5/–	—
Fig. 16—Shoes	3/–	3/6	4/–	7/3	—
Patent Slip Joints	13/6	14/9	15/6	18/6	—

Pipe Clip, 3/–; Mica Vent, 7/–; No. 55 Soil Pipe Vent, 8/6, 23in. long x 4in.

All above Pipes and Fittings can be supplied Glass Enamelled Inside above prices, plus fifty per cent.

PLUMBERS' LABOR, &c.,

Lead Water Service Pipes, per lin. yard, Weight and Labor.

Dia.	Lbs.	Labor.	Dia.	Lbs.	Labor.
½	2	0 4½	1	4	0 8½
¾	3	0 6½	1¼	5½	0 10½

Solder required to Wipe Lead Pipe Joints.

1lb. of solder per inch dia. of lead pipe, viz., 4lbs. required to wipe a 2in. dia. pipe joint.

Lead Waste Pipes, Weight per yard.

¾in. dia., 5½lbs. 1in. dia., 9lbs. 1¼in. dia., 13lbs. 1½in. dia., 15lbs. 2in. dia., 21lbs.

Cost per foot run ¾ in. Lead Water Pipe, at 2lbs. at 52/– per cwt. Material, 1/–. Labor, per foot, –/7 = 1/7.

SHEET LEAD.

Sheets, 30 to 40ft. long, by 7ft. wide.

Per sq. ft.		in.	Approximate Gauge.	Per Roll. cwt.	qr.	lb.
3lbs.	=	1/20	No. 18	6	2	0
4lbs.	=	1/15	No. 16	8	2	0
5lbs.	=	1/12	No. 14	10	3	0
6lbs.	=	1/10	No. 12	13	0	0
7lbs.	=	1/9	No. 11	15	0	0
8lbs.	=	⅛	No. 11	17	0	0

Price, £46 per ton ; £49 cut to lengths.

LABOR ONLY.

Award wages, 2/9 per hour.

	s.	d.
Laying sheet lead, flats and floors, 10ft. lengths (including solder, hooks, nails, &c.)	8	0
Small flats, cut sheets	10	0
Laying Gutters	12	0
Ridges, valleys and hips	12	0
Step flashings	15	0
Damp course to chimneys walls, and windows, 3lb. and 4lb.	11	0
Lining small cisterns, 5lb. lead	16	0
Lining large cistern troughs	12	0
Laying hips, ridges and flashings to dormers or turrets, 20/– to	25	0
Add for every 10ft. above 30ft. high, extra	1	0
Soldering seams, per foot run	3	0
Making single welt, per foot run	1	0
Double welt, per foot run	1	5
Bedding in white lead, 3d. ; close copper nailing, ft. run	0	6

Labor to Lead Pipes—

Laying and fixing lead pipes, to ¾in. diam., per ft. run	0	6	
Ditto do. do. 1 to 1½in. ,, ,,	1	0	
Ditto do. do. 1½ to 2in. ,, ,, ,,	1	6	

Labor. Fixing 7lb lead Soil or Waste Pipes, 3in., per foot, 2/6 ; 4in., 4/– ; or 20/– to 24/– per cwt.

Joints at trade rates.

LEAD TRAPS.

Lead Traps, with screw, for outlet— Materials only.

	1¼in.	1½in.	2in.	2½in.	3in.	4in.
P. Trap	3 6	4 0	5 3	9 3	12 0	21 0
S. ,, ...	4 3	5 3	7 6	11 6	15 3	24 3

Labor. Fixed complete, including profit, add 5/– to 8/– extra

Traps, Brass (Tuscom) S. Trap, 1½in., 11/–; 2in., 14/6.

Add Labor, 3/– to 6/–.

LEAD TRAPS AND LEAD BENDS.

Diam. of Pipe	1¼in.	1½in.	2in.	2½in.	3in.	4in.
P. & Running ...	3 6	4 0	5 3	9 3	12 0	21 0
S.	4 3	5 3	7 6	11 6	15 3	24 3
Bag	4 9	7 6	10 0	15 3	17 3	30 6

Lengthened Tails on Traps, per extra 6in., 1¼in. and 1½in., 1/4; 2in., 1/7.

LEAD BENDS.

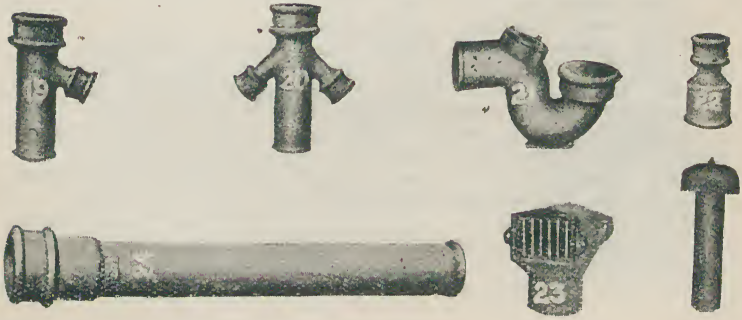
	1½in.	2in.	2½in.	3in.	4in.
18 x 12	6 9	8 6	12 0	15 3	20 9
12 x 12	5 6	6 4	9 0	12 0	18 6

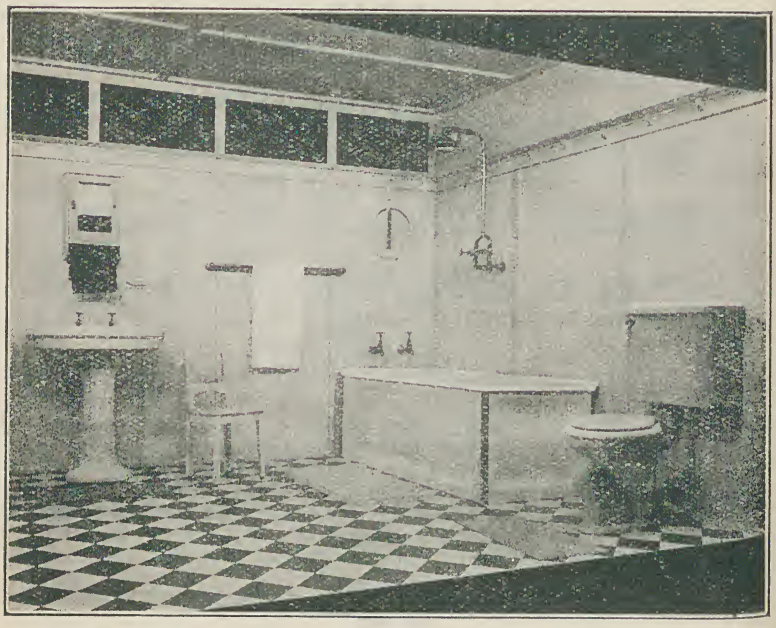
Recipe to make Plumbers' Soil for keeping solder line on pipes pipes when making them. **Soil,** for wiping joints, take ½ oz. pulverised glue, dissolve in water, gradually add a pint of lamp black with water to bring the whole to the consistency of cream. Boil and stir slowly.

Test.—Paint a little of the soil on pipe, if it comes off with a smart rub of the finger easily, add more glue till it sticks and takes a slight polish.

COST OF W.C. LEAD SEWER SOIL PIPE, MATERIAL AND LABOR, per foot.

	£	s.	d.
10ft. run 4in. x 7lbs. lead soil pipe, weight 76lbs., at 53/6 per cwt., allow waste, 2½ per cent.	1	17	3
4lb. solder, 5/–; nails –/6	0	5	6
Labor, fixing, 22/–; lead tacks and sundries, 2/– = 24/–. Add 1/– profit = 10/–	1	14	0
7/9 per l. ft. ... ... 10ft. run, net cost	£3	16	9





SANITARY.

Syphonic Closet Suites.—*See* Illustration.

With maple seat, £10/10/–; white celluloid seat (English), £11/11/–.

BATHROOM FITTINGS.

Towel Rails (Nickel Plated), 24 x $\frac{5}{8}$, 10/6; 24 x $\frac{1}{2}$, 8/6; Opal, 24 x $\frac{5}{8}$, 27/6.

Glass Shelves, with N.P. Brackets, 17/6, 20/–, 22/6.

Soap Dishes, 7/6, 9/–, 13/–.

Bath Seats—Oak, 15/–, 27/6, 30/–.

Bath Heaters, Nickel Plated—Gas: Tylor's "Eclipse," with shower, £17; Tylor's "Superb," £10/17/6; "Dinkum," £5/10/–; Metter's No. 10, £3/10/–; (Chip): "Cashe's," with shower, £4/17/6; "Malley's," £3/2/6. Stand for ditto, 12/–.

Closets, for non-sewered Situations, "Igene" and Farmers' Sanitary Pan, Dry earth closet, £3/15/– and £5/–/–.

Cover and seat for dry earth closet, enamelled, 20/– to 22/6, including gal. iron cylinder with seat.

Sanitary Combinations—

Complete with 6ft. Vent Shaft and Cowl (provision made to remove Pan at back, 50/–.

No odor, with fixed seat and flap, round cover, 22/6.

B. Intercepting Grease Trap
(Patents Pending)

GREASE TRAP.

Best White Fireclay Pedestal Stop Hopper, with hinged brass grating and wood slip, £12.

G.E. Intercepting Grease Trap, 2ft. x 18in. x 12in. Price

PLUMBERS' MATERIALS.

Gas Rings, 2/6 to 25/–; **Flexible Steel Gas Tubes,** 5d. per ft.; **Pushons,** 4d. each.

Gas Stoves—K.F.B., from £12; "Canberra," £15; "Early Kooka," £15/10/–, £16, £17/10/–, £20, £25, £30.

Baths (Australian), cast-iron enamelled, 5ft. 6in., £8/15/–.

Coppers (Gas), with draw-off cock and loose lid—14-gall., £6/15/–.

Doors (Furnace), etc.—Doors and Frames, 10in. x 8in., 7/6; 12in. x 10in., 9/6.

Grates, 10in. x 8in., 5/6; 12in. x 10in., 9/– each.

Dampers, 12in. x 10in., 10/– each.

Pipes and Fittings (Galvanised): Prices on application.

Sinks—Cast Iron Enamelled, 15in., 21in., 27in., 30in., 1s. 8d. per in.

Wash Tubs (Gal.), 3 Division Wash Tubs, 24 gauge, 47/3; 2 Division Wash Tubs, 24 gauge, 36/–; with scrubber, 42/9.

Urinals, Bristol Glazed, 16/6; Salt Glazed (stall), £5/5/– per stall; White Glazed Gutter for Urinals, from 6/6 per ft.

LAVATORY FITTINGS.

Basins, White G.E. Lavatory Basins, with Cast Iron Brackets and Frame, N.P. Plug and Washer, flat back, from 37/6 to £5/10/–; angle from 57/6 to £5/10/–; Pedestal Lavatory Basins, 27 by 19, with N.P. Plug and washer, £8 to £12/10/–.

Closet Seats, Colonial, 13/6, 21/–, 22/6; English, 17/–, 25/–, 27/6; Genuine "Never Split," 30/–, 35/–.

URINALS.

Fireclay White Glazed Range Urinals, 4ft. 4in. high, 2ft. wide, with fire clay automatic cistern and polished copper pipes, per stall, £15 to £22.

Single Flat Back, without lip, 13in. wide, white glazed, each 21/– to 30/–.

Single Flat Back, with lip, 14½in. wide, white glazed, each 30/6: angular, 47/6.

Single Stall Fixture Cistern and Flush Pipe, £22.

ESTIMATE FOR WATER CLOSET.

	£	s.	d.
Pedestal Closet, white, £1/17/–; maple seat, single flap, 13/–	2	10	0
2 gal. Cistern, cast iron, £2; 1½in. Flush Pipe lead, 9/– ...	2	9	0
½in. Ball Stop Cock, 3/6; 12ft. ¾in. Connecting Water Pipe at 5d.	0	8	6
12ft. of 2in. Vent Pipe, fixed at 5d., 5/–; Ventilating Cowl, fixed, 3/6	0	8	6
	5	16	0
Plumber's Labor	4	0	0
Approximate net cost	£9	16	0

If on 1st floor, add for cast iron and lead soil pipes, &c., with extra labor.

CISTERNS (Lavatory).

	s.	d.
Malley's Syphonic Concrete (with brass syphon)	40	0
Malley's Syphonic Porcelain (with brass syphon)	77	6
Concrete (with concrete syphon)	44	0
Concrete (with brass syphon)	50	0
White Earthenware	84	0
"Mallite" Concrete	32	6
Concrete "Multi" (no ball cock)	40	0
Cast Iron Multi Flush (no ball cock)	44	0
Cast Iron Multi Flush (no ball cock)	44	0
Cast Iron National Improved	31	6
Cast Iron, 2 gall. "Murphy" complete	35	6
Chain Pulls, China Handle, N.P. Chain	1	6

Glass enamelled, 38/– to 61/–; Painted Cisterns, 30/– to 51/–; Automatic cisterns, 30/– to 60/–.

LAUNDRY TUBS, etc.

Tubs (Concrete Washing), Reinforced—

2 Compartments—Single waste	28 6
3 Compartments—Three waste, 65/–; Pedestals, per pr.	9 6

Galvanised Irin Tubs to be fixed—	2 comparts.	3 comparts.
26 gauge	18/6	28/–
24 gauge	30/–	38/–

Fire-clay Laundry Tubs—

20 x 16 inside, 2 compartments £9	10 0

SINKS.

Porcelain Enamelled Cast Iron Sinks, with Plug and Washer—

Inside measurement, ins.	15	18	21	24	27	30
Net prices, each... ...	18/–	20/–	24/–	28/–	33/–	36/–

Fire Clay Sinks, White Glazed inside, Cane Glazed outside—

Outside measurements—

21in. long x 15in. wide x 8½in. deep, with plug and washer	35/–
24in. long x 15in. wide x 8½in. deep	38/–
27in. long x 17in. wide x 9in. deep	48/–

Draining Boards (Terazza), 4ft. x 1ft. 6in., with 18 x 12 hole, 37/6. Special Sizes extra.

Draining Board and Sink Combined, Aluminium, from £6 ; Cast Iron, Enamelled, £9/10/–.

LABOR ONLY.

Bath, fixing with waste and fitting with water and labor.—Ground floor, £3 ; first floor, £4 10s. With extra water and water pipes, £7 to £9

Basins, wall or pedestal, from £3/10/–.

W.C., ground floor, from £4.

Pan, fixing, Cistern and Concrete Drain Pipe, floor level, first floor, £8.

W.C., fitting up throughout, labor and materials, average price and goods, including pan, cistern, waste and seat, £25.

Fixing 4ft. Urinal " Stall," single waste, from £7 ; two wastes, £9.

Fitting Gas Heater, labor only, with flue to ceiling, £2/10/–.

Labor fixing fittings, bath and kitchen : Rails and glass shelves, each, from 5/–. Pedestal, fourseats, from 7/– each. Bath Heaters, gas, from £4/10/–. Chip Heaters, with flue, £2/15/–. Gas Stoves, for water and gas pipes, ready to join on, from £6.

SEAMLESS COPPER BOILERS.

Prices are now as under, but are subject to alteration without notice.

	Dia. in.	Depth in.	Light s. d.	Heavy s. d.	Extra Heavy s. d.
10 gallon	18½	13¾	18 6	20 0	27 6
12 ,, ...	19⅝	14	21 0	23 0	32 6
14 ,, ...	21	15	25 0	27 6	37 6
16 ,, ...	21⅝	15¼	30 0	33 0	45 0
18 ,, ...	22¼	16½	35 0	38 0	50 0
20 ,, ...	23¼	17	40 0	44 0	53 0

PORTABLE GAS COPPER PRICE LIST.

S.L.W. Brand—Fitted with Seamless Copper Boilers—Tinned.

	£ s. d.		£ s. d.
10 gallon	2 16 0	16 gallon	3 17 6
12 ,, ...	2 18 0	18 ,, ...	4 10 0
14 ,, ...	3 4 0	20 ,, ...	4 15 0

¾in. Draw Off Taps, 10-16 Gal., 12/6 ; 18 and 20, 15/– extra.

BATHS ONLY.

(Trade Price.)

	5ft.	5ft. 6in.	6ft.
Galv. Iron—			
Malley's Special, on legs, 24G.	67/–	67/–	67/–
Malley's No. 2 and. bottom, on legs, 24G	50/–	50/–	50/–
Beaded, flat bottom, 26G. ...	29/–	30/–	32/–
Beaded, flat bottom, 24G. ...	33/–	34/6	36/–

Cast Iron Painted, 5ft. 6in., only, 80/–.

Porcelain Enamel—

1sts, 5ft., £5/15/–; 5ft. 6in., £6; 6ft., £6/10/–.

1st quality, 5ft. 9in., with 4in. roll, £7/10/–; 6ft. 3in., £8.

ALPHA BATHS, flanged for building-in. *See* room illustration.

1st quality, 5ft. 6in., £8; 6ft., £9.

2nd quality, 5ft. 6in., £7; 6ft., £7/10/–.

Concrete Baths, 5ft. 6in., 65/–; Bolts for W.C. Seats, 1/– pair.

SHOWER.

"**Paragon**" **Bath,** spray and shower, glass screen ... £37 to £55.

Copper Shower Heads, for fixing over baths—

6in.	7in.	8in.	10in.	12in.
3/6	4/6	6/–	8/–	12/–

Bath Screen, to fix on rim of bath, gal. iron, 1in. coir, 5ft. high x 2ft. 6in. sides and back, £3.

It is important that the tank be not too small, overheating is liable to occur, causing a noise and backing the hot water into the cold water pipes.

STORAGE TANK CAPACITY.

The following table for determining the size of the Storage Tank necessary for a hot water supply apparatus is the result of practical experience; the quantities of water may, however, vary according to local conditions, for which due allowance must be made.

Temperature	100deg. F. Gallons.	125deg. F. Gallons.	150deg. F. Gallons.
For a bath	50	33.3	25.0
For each Tap for washing purposes in Flats	5	3.3	2.5
Ditto in Hotels	20	13.2	10.0
For a Lavatory Basin ...	5	3.3	2.5
For a Shower-bath	9	6.0	4.5

Copper Storage Cylinders, 30 gal., £32 15s.; 50 gals., £16 12s. 6d.; 100 gals., £30.

To prevent overheating of the water, automatic regulation of the draught doors is used to advantage. Danks' Ideal Domestic boiler is a cast iron conical stove, with a governor for regulating the supply. Prices range from 6 gallons capacity boiler, £10; slow burning fire, ample water ways; 11 gal., £16; 21 gal., £30 10s.; thermometers 12/6, for a ½ inch thread gas pipe.

Labor.—The fixing of hot water pipes cost from 6d. to 1/- per foot run.

"Cleveland" Geyser, with shower attachment taps, complete, £8.

Installations, water heater for basins, 14in. x 6in., £3 10s.

Ideal Radiator room heaters, 36in. x 5½in.

See Advt., pp. 10, 23.

Basin Heater.

WROUGHT-IRON PIPES, PER FT. COPPER PIPE.

Bore Ins.	Thickness of Iron. in. 1/16 lb.	in. 1/8 lb.	in. 3/16 lb.	in. 1/4 lb.	in. 5/16 lb.	Thickness. Bore.	The Weight of a ft. in length. in. 1/16 lb.	in. 1/8 lb.	in. 3/16 lb.	in. 1/4 lb.
3/8	.3	.7	1.1	...	...	½in.	0.42	.94	1.60	2.27
½	.4	.83	1.4	2.0	...	5/8	0.52	1.14	1.79	2.65
5/8	.46	1.1	1.6	2.3	3.1	¾	0.62	1.33	2.17	3.02
¾	.54	1.2	1.9	2.6	3.5	½	0.7	1.51	2.45	3.40
7/8	.6	1.3	2.1	2.9	3.9	1	0.80	1.69	2.73	3.77
1	.7	1.5	2.4	3.3	4.3	1¼	1.00	2.08	3.29	4.50
1¼	.87	1.8	2.9	3.9	5.2	1½	1.15	2.42	3.85	5.30
1½	1.0	2.1	3.3	4.7	5.9	1¾	1.40	2.87	4.48	6.08
1¾	1.2	2.5	3.8	5.3	6.8	2	1.56	3.21	5.00	6.80
2	1.4	2.8	4.3	5.9	7.6	2¼	1.74	3.58	5.56	7.55
2½	1.7	3.5	5.3	7.3	9.3	2½	1.94	3.97	6.14	8.31
3	2.03	4.1	6.3	8.6	10.9	2¾	2.09	4.34	6.73	9.12
3½	2.34	4.7	7.3	9.8	12.5	3	2.27	4.78	7.30	9.82

Lead Required to Caulk Iron Spigot and Socket Pipes—lbs. per Joint

Interior Diameter of Pipe. in.	Length of Socket, inside measure. in.	Weight of Lead per Joint. lbs.	Depth of Lead in inches. in.
1½	2½	1¼	1⅜
2	3	1¾	1½
2½	3	2¼	1⅝
2	3	2¾	1⅝
4	4	4	1¾
5	4	5½	1⅞
6	4	7	2

HOT WATER FITTER.

The Combined System is the cylinder and the storage tank system in one. The combination is claimed to overcome dangerous conditions which might arise if the tank system was emptied when the water supply failed. It also produces a better flow at the high taps. The reverse is sometimes associated with the cylinder system when used alone.

ROOF-SLATER, TILER, SHINGLER.

1923 Award Wages, 2/7½ per hour.

SLATING, PER SQUARE.

Measurement, if not otherwise stipulated.

Take the net measurement of area covered.

Add the length of the eaves by 1 foot wide.

Add the length of all cuttings to hips, valleys, dormers, chimneys, etc., by 6 inches wide.

The battens generally specified, are 2in. x 1in. deal; if wider they are apt to curl up with the heat and loosen the slates.

Spacing.—Battens for slates and shingles require the same distance apart, centre to centre, that the width of slates exposed show when laid.

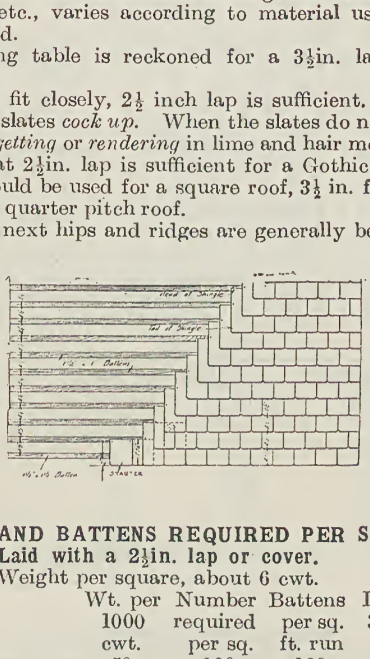
To find the number of battens to length of rafter:—The lap or cover of slates, etc., varies according to material used and pitch of roof to be covered.

The following table is reckoned for a 3½in. lap—that usually specified.

If the slates fit closely, 2½ inch lap is sufficient. The larger the lap the more the slates *cock up.* When the slates do not fit closely, the roofs require *pargetting* or *rendering* in lime and hair mortar.

Allowing that 2½in. lap is sufficient for a Gothic roof of 60 deg., then 3 in. lap should be used for a square roof, 3½ in. for a third pitch, and 4in. lap for a quarter pitch roof.

The *cuttings* next hips and ridges are generally bedded in mortar.



SLATES AND BATTENS REQUIRED PER SQUARE.

Laid with a 2½in. lap or cover.

Weight per square, about 6 cwt.

	Wt. per 1000 cwt.	Number required per sq.	Battens per sq. ft. run	Labor and Nails 3½ lap	Labor and Nails 4½ lap
Duchess, 24 x 12 ...	50	120	120	9/–	8/–
Countess, 20 x 10 ...	33⅜	180	150	11/–	10/–
Viscountess, 18 x 10 ...	30	208	175	12/–	10/6
Ladies, 16 x 8	20⅞	300	200	13/–	12/–

Eaves or cuttings to waste must be allowed for.

METHOD FOR FIXING SLATES ON ROOF.

Spacing battens for 24 x 12 slates, 10½ inch centres.
Spacing battens for 20 x 10 slates, 8½ inch centres.
Slates cut for bottom starters, 24 x 12 slates, to 13½.
Slates cut for bottom starters, 20 x 10 slates, to 11½.

Nail the top head of the slate half way on batten from bottom batten (for bellmouth), 2½ x 1½ on edge bevelled to roof.

Circular slating, one-third to one-fourth extra for labor, but for materials according to actual waste in radiating the sides, etc.

For **fancy cut slating,** reckon from one-third to twice more for the labor, which includes nailing on the battens.

For stripping roofs, reckon one-half the given prices, for " Labor and metal nails."

Rendering or pargetting slate joints, per foot run, about 2d.
Ditto do. in lime and hair mortar, per square, 10/–.
Bedding, Hips and Ridges, per foot run, 4d.

Cutting through slate roof for 4 inch gal. iron **vent pipe,** and making good with slates and lead apron, 10/–.

	s.	d.
Mitred slate hips, with " soakers " bedded, over waterproof felt ...	1	6
If under-bedded with 2lb. lead soakers per foot run	3	0

METHOD FOR MEASURING.

If the roof is **plain and unbroken,** take the length of the longest eave, and multiply it by length of rafter, double for both sides of roof. Gables and hip roofs measure alike, but add extra for projection of gable ; also extra for the cutting of hips.

For broken roofs of the same pitch throughout, reckon the whole area as one roof, and allow extra for cutting valleys, hips, and ridges.

In irregular pitched roofs measure the eaves in sections, and multiply by the different lengths of the rafter above each section.

SLATES PER 1000.

The prices of slates vary according to tariff and supply. The Willunga blue roofing, size 18 x 9, £23 15s. ; 18 x 10, per 1000, 27/5. 20 x 10, 32/–. Small parcels, £2 extra per 1000.

N.S. Wales Slate Co. Ltd., Goulburn and Mudgee roofing slates, purple, grey, green and blue, price fixed in city or suburbs, £5 10s. J. Muir, Redfern.

Estimated cost of Slate Roof per square.

Willunga Slates, 20 x 10, at £32 per 1000—			
Slates, 180 per square	£3	15	0
Oreg. Battens, 150ft. run, 2 x 1 = 25 sup. ft. at 28/– ...	0	7	0
Nails, 9d. ; and 2lb. slate compo. nails, 1/6	0	2	3
Labor to slates and battens	0	10	0
Net	£6	14	6

MATERIAL ONLY GOULBURN ROOFING SLATES, 1925.

Prices nett, liable to fluctuation.

James Muir, Redfern, Sole Distributor.

All sizes, Purple, Blue, Grey and Green.

The prices " per square " fixed on roof at Sydney and suburbs.

The prices " per 1000 " are F.O.R. Sydney (for Northern orders) and Goulburn (for Southern orders), and do not include freight or cartage.

Green, 20 x 10, £66 per 1000.

Purple, Grey and Blue.

Size	Price per 1000 from £ s. d.	No. Tiles per sq.	Price per square fixed from £ s. d.
24 x 14	57 19 2		
22 x 12	45 10 9		
20 x 12	41 6 11		
20 x 10	34 10 0	170	6 5 0
18 x 10	31 0 7	188	
18 x 9	28 6 3	214	
16 x 10	28 6 3	212	
16 x 9	24 16 9	236	
16 x 8	22 1 6	264	
14 x 10	23 19 2	242	
14 x 9	21 14 8	269	6 0 0
14 x 8	19 6 8	303	
14 x 7	16 18 0	346	
13 x 7	15 14 3	372	
12 x 10	20 13 10	283	
12 x 9	18 12 6	314	
12 x 8	16 11 2	353	5 15 0
12 x 6	12 8 3	471	
10 x 10	17 3 4	339	
10 x 8	13 16 0	424	
10 x 6	10 7 0	556	

TERRA COTTA ROOFING.

This cheerful and picturesque roofing material is very suitable for our bright and warm climate, as it is much cooler than slates, although slightly heavier. It does not necessitate any alteration in the construction of roof supporting timbers.

The weight of Tiles (Marseilles pattern) is about 7 cwt. to the square when laid.

1000 Tiles weigh 2¾ tons.

The shingle pattern tile is also made with fancy cut edges, suitable for ornamenting small roofs, over porches, dormer windows, balconettes, and projecting window shades.

It is not advisable to have the pitch of roofs too flat, owing to the collection of dust and moisture, which in course of time will discolour the tiles.

Material required.—Bedding: 100 feet run of Terra Cotta Ridge

Tiling, fixing: 2 cubic feet lime and hair mortar. **Pointing up**: 1 cubic foot cement mortar and 2lbs. of red oxide for coloring.

Labor: Tiler, bedding and pointing 150 feet run of tile ridging and hips is 2 days.

ROOF TILING AND SHINGLING.

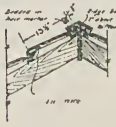
Terra Cotta Tiles (French pattern), weight 2¾ tons per 1,000.

Requiring 127 tiles per square. 1000 tiles cover nearly 8 squares. Requiring 90 feet run of 2 x 1 battens.

Terra Cotta Shingle Tiles, requiring 550 tiles per square. 280 feet run battens.

Glass Roofing Tiles, to match, Marseilles pattern, each 5/–.

T.C. Ridging.—Plain, per ft., 6d.; Crested, 1/–; Finials, from 8/– each; Starters, 1/6 each; Apex Pieces, 3/– each; Stop Ends, 2/– each; Close Hips, 2/9.



CONTRACT PRICES, 1926.

Roofing Tiles, Marseilles Pattern, per square, 10ft. x 10ft.

Red Tiles, fixed	£3	8	0
Chocolate, dark	4	5	0
Glazed Tiles	5	0	0
Shingle Tile, square fixed ...	6	10	0
Ditto, Chocolate	7	10	0

Ridges, –/9; Chocolate, 1/3 run. foot and hips.

Rafter	No. of Courses
1ft. 3in.	1
2ft. 4½in.	2
3ft. 6in.	3
4ft. 7½in.	4
5ft. 9in.	5
6ft. 10½in.	6
8ft. 0in.	7
9ft. 1½in.	8
10ft. 3in.	9
11ft. 4½in.	10
12ft 6in.	11
13ft. 7½in. ...	12

Rafter	No. of courses.
14ft. 9in. ...	... 13
15ft. 10½in. ...	... 14
17ft. 0in. ...	... 15
18ft. 1½in. ...	... 16
19ft. 3in. ...	... 17
20ft. 4½in. ...	... 18
21ft. 6in. ...	... 19
22ft. 7½in. ...	... 20
23ft. 9in. ...	... 21
24ft. 10½in. ...	... 22
26ft. 0in. ...	... 23

PRICES FOR TILED ROOFS.
Covered in City and Suburbs, 1925.

"Neverleak" Roofing Tiles and Battens.

Ordinary Terra Cotta, £3 8s. per sq.; Specially Selected, £3 10s.; Chocolate, Terracotta, £4 5s.; Glazed, Special, £4 10s.; Glazed, Ordinary, £4 5s.; Semi-Glazed, £3 12s. 6d.; Shingle Tiles, £5 5s.

Cement Tiles, (including Cement Ridge), £2 10s. per square.

Accessories.

Ridging, plain red, –/9 per ft.; Glazed and Chocolate, 1/3.

Apexes, Glazed, 4/6 ea.; Plain, 3/6. Starters, Glazed, 2/6 ea.; Plain, 1/6.

SHINGLING.

Material per square.

Forest Oak Shingles, 15 x 3½, 8 bundles cover 100 sq. feet. 80/– per 1000, will cover 100 sq. feet.
Redwood Shingling, 4 bundles cover 100 sq. feet, at 15/– per bundle = 60/–.

Number of Shingles a good tradesman should lay per day of 8 hours :—

Redwood Shingles on a roof, 2000 to 2,500.
Shingles on walls, 1500 to 2000.

NUMBER OF SHINGLES OR SHINGLE TILES.

Required to cover a square, stating average width of shingle and length exposed to weather, or width of rows seen.

Width of Rows seen. Inches.	Width of Shingle. 4in.	6in.	1000 Shingles will cover ft. 4in. Shingle. sq. ft.	6in. Shingle. sq. ft.
4	900	600	110	168
5	725	485	140	210
6	605	405	167	250
7	515	345	195	292
8	451	306	225	335

Labor per square and Battens required.

	Labor.	Battens.
Metal Shingles, from	7/6	100
Slates, 20 x 10	10/–	150
Asbestos Cement Slates, diagonal ...	7/– to 10/–	150
Redwood Shingles	17/6	190
Oak Shingles, 15 x 3½	25/–	210
Shingle Tiles, Terra Cotta	22/6	190
Tiles, French pattern	7/6	90

Wall or Gable, add 30 per cent. for labor.
Half 5ft. Palings, 100 per square 8/–

Vulcantile is an **Asphalt Felt Roofing** shaped-like Tile, made in rolls 25½ins. wide, containing 2 shaped strips, various colours, light and dark grey, terracotta, brown and green, covered with crushed silica, and coloured quartz and rock crystals, producing a glistening surface.

Four rolls with a 4in. lap (equalling 3 thicknesses) will cover 100 sq. feet or one square, and weighs 200lbs. To be nailed on lining board, or even surfaces, with ⅝in. copper clouts, suitable for hoods. Labor laying per square, 6/6.

Zinc Tile Roofing.

The ornamental zinc tile roofing is very light, and can be used with advantage in covering steeples, pinnacle roofs, mansard roofs, and other steeply pitched constructions, or where weight has to be considered.

For particulars, *see pp.* 3, 26.

EXAMPLE OF ESTIMATING SHINGLE TILE ROOFING, per square.

	£	s.	d.
500 best glazed tiles to square, £8 1000	2	4	0
280ft. run 1½in. x 1in. battens, at 3/9...	0	10	6
Labor Award	1	2	6
Nails and Waste	0	2	0
Net	£3	19	0
Incidentals and Profit	1	0	0
	£4	19	0

SLATERS' AWARD, 1926.

Labor only, 2/9 per hour.

Slates punched ready.

Fibro Cement.	per square s. d.	Roofing Slates.	per square s. d.
Labor laying.			
16 x 16 diagonal ...	7 6	20 x 12	9 0
15 x 15 „ ...	8 6	20 x 10 ...	10 0
12 x 12 „ ...	10 6	18 x 10	10 6
24 x 12 square ...	8 6	18 x 9	11 0
Rendering	2 6	16 x 10	11 6

Mitring hips, 20ft. and over, 1/3; under 20ft., 1/6.
Ridging, –/3; if punched on job, 1/6 per 100.
French tiles, every second tile wired, 7/6 per square.
Chocolate, semi glazed, every second tile wired, 8/6.
Slate and Lead, glazed and wired, 9/6.
Cement tiles, labor per square, 10/6.
Shingle tiles, nailed at hips, caves, valleys and gables, 22/6 square.
Rendering, per square, 5/–.
Shingles, redwood, sawn on roofs, 17/6.
Oak, 25/–; mitring, 1/–; oak, 1/3.
Cottage work only, battens softwood, H.W. 1/– extra. for all stories above first, 1/– extra per storey.

GENERAL ROOFING ESTIMATES.

Labor and covers per square.

Galvanised Iron, at £25 per ton, or 25/– per cwt.—	£	s.	d.
1⅛ cwt. per square, 26 gauge	1	9	0
Labor, laying iron— 7/–; screws and washers, 1/– ...	0	8	0
Oreg. Rafters, 2ft. spaced, 6—10's = 60ft. run, 4 x 2, at 28/–	0	11	3
Labor, cutting rafters and fixing battens, 6/– and nails, 9d.	0	6	9
3 x 1½in. battens, 2ft. 6in. apart = 50 l. ft. at 30/– per 100 s. ft.	0	6	0
Gal. iron and rafters, net price	£3	1	0

	£	s.	d.
Redwood Shingles, at 10/6 per bundle, 4 bundles per square	2	2	0
Battens, 190 ft. run, 2 x 1, at 30/– ; nails –/6 ...	0	10	6
Labor, shingling 17/6 ; battens, 3/6 ; nails, 2/6 ...	1	3	6
Net	£3	16	0

Forest Oak Shingles	£	s.	d.
Shingles at 80/– per 1000—			
800 oak shingles to square	4	0	0
Oreg. Battens, 210 l. ft. to square 1½in. x 1in., at 30/–...	0	19	6
Labor to shingles, 25/– ; to battens, 4/–; nails, 3/6 ...	1	12	6
Nett	£6	12	0

Add for Rafters and Profit.

RAFTERS TO THE SQUARE.

	£	s.	d.
Oregon Rafters, plain gable roof, spaced 18in. apart, 8—10's = 80ft. run, 4 x 2, at 26/– per 100 sup. ft.	1	2	0
Labor, cutting, hauling and fixing, 8/6 ; nails 1/6	0	10	0
Net	£1	12	0

Add extra for hips, waste and profit.

Terra Cotta Tiles, French pattern, £15 per 1000—	£	s.	d.
Tiles, 130 per square, at 30/– per 100	2	0	0
Battens, 90ft. run, 2 x 1 oregon, 5/– ; nails, 1/– ...	0	6	0
Labor to tiles, 7/6 ; battens, 2/6 ; 1lb. copper wire, 1/6	0	11	6
Nett	£2	17	6
Rafters as above to be added	1	12	0
Nett...	£3	9	6

Fibro-Cement and Asbestos-Cement Slates, 16 x 16in.—4in. lap, laid diagonally. 100 Slates (Greys) cover 1 square.	£	s.	d.
100 slates at £21 per 1000	2	2	0
100 crampons at 22/– = 2/3 ; clouts, –/6	0	2	9
150ft. 2 x 1, and batten nails, spaced 7½ inches... ...	0	7	6
Labor to battens, slates and nails...	0	10	9
Net	£3	2	6

Add for Profit.

Shingle Tile, 10½ x 6 x ¼ thick Roof—			
550 tiles at £6 per 1000	3	6	0
280 ft. run 1½ x 1 batten at 3/9 100 ft. run	0	10	6
Labor, award	1	2	6
Nails	0	2	0
Nett	£5	0	0
Add Profit, &c.	1	10	0
Stated contract price	£6	10	0

TERRA COTTA.

Terra Cotta Lumber, having passed through 2,000 to 2,500 deg. Fahrenheit, is suitable for fire-proof ceilings, floors, girder casing, column casing, and partitions. The shape and size of wall partition lumber is given below. Absolutely **no shrinkage,** and is fire and sound proof.

These hollow blocks are much lighter than solid brickwork, and therefore especially adapted for arches; its crushing weight is said to be 840lbs. per square inch, and will effectually resist the joint assault of fire and water. It will also readily receive nails driven into it for slating etc., without the use of the usual wooden battens.

Terra Cotta Lumber, delivered on site in City, or Liverpool.

LUMBER WALLING, per square yard.

Size Thick.	Price sq. yd. City	Weight sq. yd.	Size of Block	Description	Labour and Cement.
ins.	s.	lbs.	in.		s.
2	3/6	120	12 x 6	Interlocking	3/6
2½	3/6	130	15 x 9¾	,,	3/9
3	3/9	155	,,	,,	4/–
4	4/6	190	,,	,,	4/3
6	5/9	250	,,	Plain	5/3

Light T.C. Bricks, hollow, 9 x 4½ x 3, weight 5lbs. each.

Terra Cotta Lumber partitions bond in with every three course of brickwork.

FLOORING (material only).

	s.	d.
6in. x 6in. per s. yd. ...	6	6
8in. x 6in. per s. yd. ...	8	0
10in. x 6in. per s. yd. ...	9	0
12in. x 6in. per sq. yd. ...	10	6

Add—

Centering, 2/–; cement, 3 to 1, 1/– 3 0

Labor, laying, from per sq. yd. 4 0

Add Cartage to work and hoisting, per floor.

Partition Bricks, per 1000, at works ... ... 30/– to 40/–

Labor, laying, from 30/– per 1000.

Chimney Pots, red or buff, 10in. to 17in. high ... ... 4/6 to 6/–

Ditto, Octagon, round and fluted, 22in. to 27in. high 6/– to 7/6

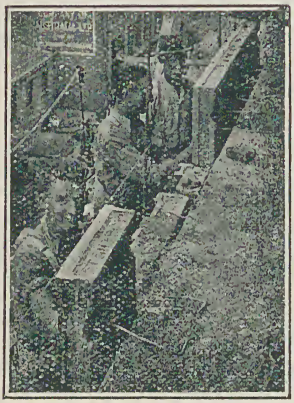
Add extra for Windguard 1/–; Blowers, 1/8; V. Caps to pot, 3/– each.

Glazed Earthenware Pots, similar designs and prices. Fixing cement 2/– extra.

ARCHITECTURAL TERRA COTTA.

This material is a mixture of special clays, which are burned to a high temperature, and usually carry a glaze on the exposed surface.

Such glazes may be either dull matt or lustrous, and may partake of almost any colour.



The Terra Cotta is used as a "facing" material for buildings and therefore assumes many forms, both plain and decorative.

Considered in its simplest form, merely as ashlar, it may be described as blocks of burned clay, usually about four inches thick, hollowed out at the back, for cement key to wall, so that the block actually comprises face, horizontal sides, and ends, with one or more intermediate stiffening ribs where necessary for strength. Consequently, less in weight than a solid facade.

In designing a Terra Cotta treatment, for facing to concrete construction or building, it is desirable to limit the sizes of blocks to a maximum of about 16 to 20 inches long, by 12 to 15 inches high. Awkward projections and decorative pieces of irregular shape should be avoided. If sizes of blocks are standardised as far as possible, greater economy in manufacture will result, as less moulds will be needed.

In fixing, Terra Cotta is bonded with brickwork, or tied back to structural steel or concrete. The manufacturers usually supply working drawings, displaying full particulars of the fixing. *See* diagram, also "Ceramic" Brickwork Section.

Cost on application.

See p. 3 for advt. of makers.

"FAIENCE" WORK.

Glazed Terra Cotta for Facing with Tiles, Concrete Buildings, F.O.B., Sydney.

	£	s.	d.
Imported, 6 inches thick	0	17	6
4 inches thick	0	15	6

For repetition work only.

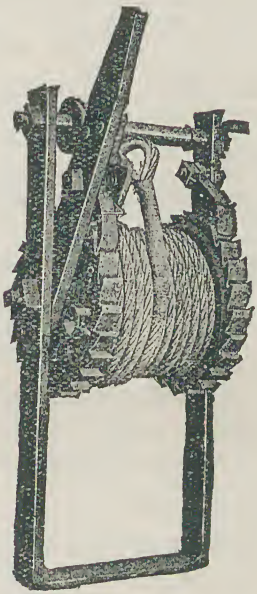
Add for Cartage, crane handling and haulage, and setting, mortar and pointing.

Union House, George St., Sydney, N.S.W. Bank, Royal Exchange, &c., Australian made in imitation. Fine granites, marbles, yellow to pink shell and fancy tints for facades.

Plain face work fixed from 20/– per sq. ft.

PATENT SUSPENDED SAFETY SCAFFOLD SOMETIMES USED FOR FACING CONCRETE BUILDINGS.

Extract from Truss Concrete Steel Job Book.



This **Safety Scaffold** appeals to the builders as one of the necessary protections against accidents, and a help to safety and speed in working, especially on **facing** the modern tall concrete building with **safety.**

For insurance of workmen, *see advt. page*, Master Builders Co.

Particulars **Leasing** of scaffold only, from above Co., from 12/– per unit of 10ft. x 5.

TILER.

WALL AND FLOOR TILES.—Labor Only, Piecework.

Tilers' Award, 1922, 2/3 per hour.

Wall Tiling, white and coloured areas 10 yds. or more—

6in. x 2in., 6/–; under 10 yds., 6/4.

6in. x 3in., 6in. x 6in., 9in. x 3in., 4/8; under 10 yds., 5/4.

Tiles fixed for vertical or diagonal joints.

3in. x 3in., 6/8; 4in. x 4in., 5/8; 6in. x 6in., 5/4.

Where diagonal panels, 12in. or square in walls, 3/4 extra.

Square or oblong pattern **panels inserted in walls**, 1/6 extra.

Where tiles on **ceilings**, 1/8 extra.

Arch and Camber Work, or soffits, to be **day-work.**

All cutting and rubbing of tiling on top of cove or skirting, where floors are graded, per ft. run, –/6.

Wall tiling to be considered to include skirting and capping if used.

If work to be tiled, vertical joint to be paid –/8 per yard extra.

Dados shall be taken to mean all tiling work **6ft. high or under**, or where **strips of 2in. wide** tiling are inserted under dados.

PANEL, STAIRCASE, DADOS AND SHOP FRONTS, at Day-Work

Hearths and Covings, piecework labor.

	each £	s.	d.
6 x 1, 6 x 1½, including the building in of splays	1	7	6
6 x 2, 4 x 2, 3 x 3 ditto. do. do. do.	1	5	0
6 x 6, 6 x 3, 4 x 4 ditto. do. do. do.	1	1	6
Surround and hearth, including brickwork for same, and making solid behind grate	1	1	6
Surround, hearth, with splayed sides	1	5	0
Facia with hearth and coving	1	10	6

Facia, tiled up to the shelf, 15/6; Hobs, built and tiled, 10/–.

HEARTHS.

	£	s.	d.
6 x 6, 6 x 3, 4 x 4 ... ... each	0	2	6
6 x 2 ,6 x 1½, 3 x 3 ... ... „	0	2	9

Where **Dutch Tiles** are used, not less than 10/– per sq. yard.

TILING WITH OPEN JOINT.

Where tiles are laid in any place or way so as to have open joints around such tiles.

6in. tile with ⅜in. joint. 4in. tile with ¼in. joint. 3in. tile with ⅛in. joint, or any other tiles or spacing in joints. They shall be paid for at the rate of 15 per cent. extra on the rates of plain tiling in this schedule.

OPALITE TILING, Award Rates.

Areas of 10 yds. or more, 4/–; under, 4/8 per s. yd.

Moulded Tiles and angle beads, from –/2 running.

Internal or external bonding, –/3; Bullnosing and cover tiles, –/3.

Internal Mitres, –/9; external, 1/–; **Skirting and capping**, –/9.

Dados shall be considered to include skirting and capping if used.

	s.	d.		s.	d.
6 x 1, 6 x 1½	8	0	6 x 6	5	4
6 x 2	7	0	4 x 4	5	8
6 x 3	6	0	3 x 3	6	8

VERANDAH FLOOR TILING.

Labour Award Rates, Piecework.

6 x 6 or larger, with or without borders, 3/4 per s. yd.
6 x 6, 4 x 4, 6 x 3, **Octagon,** and dot, herringbone, &c., 3/8.
All other patterns, 4/–; inch and half **hexagon,** 5/4.

For cutting borders, extra or ordinary patterns, –/3 to –/4 per ft. extra.

All **winding paths** to be paid for at rate 5/–.

Tiles, if over ⅝in. thick, –/6 per yard extra.

MOSAIC OR CERAMIC TILING.

Square, with all square joints, 6/8; if broken joints, 5/4.

Round or **hexagon,** all broken joints, 5/–.

Door ways, and small areas under 5 yards, at day rates.

Marble, slate or other ridging or bordering to verandah, porch, –/4 per ft. run.

MATERIALS.

Tiles, English Wall (white), 6in. x 3in. x ¼ or 6in. x 6in., per sq. yd., 15/6.

Tiles, coloured, 6ib. x 3in. or 4in. x 4in., in case lots, 32/– sq. yd.

White Capping, 6in. x 2in., per ft. run, 1/6; stop-ends, angles, angle beads, 1/– per ft. run.

Tiles, Floor, unglazed, in plain colours, from 14/– per yd.

"**Terazzo,**" made in concrete faced and rubbed smooth in marble chippings, red, grey and blue.

Threshold steps, 12in. wide, with nosing point edge.

Stock sizes 3ft. to 4ft., in 3in. increases up to 7ft., per ft. run, 3/6; over 7ft., 4/6. Full return nosings, 1/– each.

Step Risers, "Terazzo," up to 5ft., per ft. run, 1/9.

"Arkilite," "Ironite," "Metalite" Steps, a cement concrete surfaced material. Stock sizes, coloured red, grey, black, 12in. x 1½in., per ft. run, 1/6 to 7ft. long.

For **labor** and cement in bedding, add from 1/6 to 2/6 each step according to length. *See* Award, Tilers'.

Terazzo Draining Boards, for sinks, 18in. x 12in., size 4ft. x 1ft. 6in., each 28/–. Special sizes, per square ft., 4/6.

Terazzo slabs for walls, facings and floors, laid on site, 25/– Syd.

Ceramic Mosaic Tiling is composed of small circular, square, and octagon vitrified porcelain tiles about ¾in. x ¼in. thick, formed into numerous designs and mounted upside down on paper similar to other mosaics. They are laid on the prepared cement bed with the paper surface upwards. The paper being removed after the mosaic is in position.

Ceramic Mosaic Tiles, per sq. yd.

Material only, 25/– to 35/–. 5/– to 6/8 **Labor** laying. *See* Award.

TILING TERMS.

Plain tile is a tile 10½in. long, and 6½in. wide. Pantile is 13½in. long, and 9½in. wide.

1000 tiles = 1 horse load.

1000 plain tiles weigh 22¼ cwts. 1000 pantiles weigh 47 cwts.

A **plain tile lath** is 1¼in. wide, and ¼in. thick.

A **pantile lath** is 1½in. wide and 1in. thick.

12 **pantile laths** 10ft. long constitute a bundle.

100 plain tile laths measure 5ft. long. 125 4ft. long. 167 3 ft. long. 500 feet., any length = 1 bundle.

30 bundles plain tile laths = 1 horse load.

TILES REQUIRED PER SQUARE YARD.

Size Tile.	Number Required	Size Tile.	Number Required	Size Tile.	Number Required
15 x 15in.	5¾	6 x 4in.	54	4 x 2in.	162
12 x 12in.	9	6 x 3in.	72	4 x 1½in.	216
10 x 10in.	13	6 x 2in.	108	4 x 1in.	324
9 x 9in.	16	6 x 1½in.	144	3 x 3in.	144
8 x 8in.	20¼	6 x 1in.	216	3 x 1½in.	288
7 x 7in.	26½	4½ x 4½	64	3 x 1in.	432
6 x 6in.	36	4 x 4in.	81	2 x 2in.	324
5 x 5in.	52	4 x 3in.	108		

1 bag Cement, 125lbs., with 3 bags of sand, will bed 6¼ square yards, ¾in. thick. (*See* Plasterers).

Plain enamelled coloured, per sq. yd., 30/–.

Special **Granite Tiles,** Cream, brown, leather. Sizes 4in. x 4in., 6in. x 6in., 9in. x 6in., per sq. yd., 30/–. Without inset designs, or lines.

Moravia, a very small oblong tile, unglazed, dull, variegated tints, from brown to pink. Sizes, 2in. x 1in., 12/6 per sq. yd.

The Upson Fibre Tile, for bathrooms, &c., in sheets. (*See* Asbestos.)

Hearths, glazed, coloured, 4in. x 1ft. 3in. each, from 15/– to 18/6.

Tile fender, from 20/– each.

Fancy Majolica Tiles, Hearth, 15/– to 21/–.

6in. Skirting, in special colours, 18/– per doz.

DELFT (Dutch) WALL TILES.

Dadoes, including capping and round edge, tiles, with introductions, from 42/6 per yd.

Ditto, including art glazure, metal lustre and accidental effect tiles, from 50/– to 60/–.

Ditto, with gold and silver, to £8 per yd.

Ditto, composed of 6½ x 9¾in. White tiles, 27/6 per yd.

Ditto, composed of 6½in. x 9¾in., Granite or in plain enamel majolica glazures, 35/– per yd.

Strips, 6in. x 1in., from 1/– to 1/6 per ft.

Imported Floor Tiles.

Special acid resisting floor tiles, in sizes from 4in. x 4in., to 12in. x 12in., from 19/– to 45/– per sq. yd.

Mosaics, from 25/– to 35/– per sq. yd.

Special extra thick floor tiles, 12in. x 12in. x 2in. thick, each 1/9.

Floor Rubber Tiles, "Rublino," 6in. x 6in., 4in. x 4in., x $\frac{5}{16}$in. thick, per sq. yd., 42/–.

Agents: Central Coal & Shipping Co., Pitt Street.

WIRE WORKER.

Woven sheets less than 4ft. super. are charged by the piece, widths of less than 1ft. are charged as 1ft.

List prices are reckoned at the present price of wire; but for general use as a guide, the quotations are as under.

Fixing to be added.

WOVEN METAL PANELS.

13 gauge Straight Laced Lattice, $\frac{1}{2}$in. = $\frac{1}{4}$ sq. ft. $\frac{1}{2}$in. mesh, Crimped Diamond Pattern.

Gauge	16	14	12	10
	1/1	1/2	1/6	2/6
$\frac{3}{4}$in.	–/11	–/8	1/3	2/–
1in.	–/7	–/7$\frac{1}{2}$	–/9	1/–
1$\frac{1}{4}$in.	–/6$\frac{1}{2}$	–/8	–/9$\frac{1}{2}$	1/3
1$\frac{1}{2}$in.	–/6	–/7	–/8$\frac{1}{2}$	1/1

Brass wire, reckon four times the above prices.

RIBBON WORK.

Mesh. Strand.	s.	d.
1in. x $\frac{3}{16}$in. double strand, per sq. ft. ...	1	9
1$\frac{1}{4}$in. x $\frac{1}{4}$in. ,, ,, ,, ,, ...	1	6
1in. x $\frac{1}{8}$in., single strand, per sq. ft. ...	1	6
1in. x $\frac{1}{4}$in. ,, ,, ,, ,, ...	1	9
1$\frac{1}{4}$in. x $\frac{1}{4}$in. ,, ,, ,, ,, ...	1	3

See advt., p. 21.

CHAIN WIRE.

Price per square foot.

Gauges	16	14	12	10	8
Mesh—$\frac{1}{2}$in.	–/8	–/9	1/2	—	—
,, $\frac{3}{4}$in.	–/7	–/6	1/–	—	—
,, 1in.	—	–/4	–/6	–/7	—
,, 1$\frac{1}{4}$in.	—	–/3$\frac{3}{4}$	–/5	–/6	—
,, 1$\frac{1}{2}$in.	—	–/3	–/4	–/5	—
,, 2in.	—	–/2$\frac{3}{4}$	–/3$\frac{1}{2}$	–/4	–/6$\frac{1}{4}$
,, 3in.	—	–/2$\frac{1}{2}$	–/3	–/3	–/5
,, 4in.	—	—	–/2	–/3$\frac{1}{2}$	–/4

"Samson" Chain Wire framed with Border Wire (panels not less than 20 sq. feet), add 3d. per square foot to the above prices. Widths less than 12in. charged as one foot. Bevelled pieces measured on the square.

Panels less than 20 sq. ft., 10 per cent. extra.

GALVANISED WIRE NETTING.

Rolls 50 yards each. Prices liable to fluctuation.

Mesh	Gauge	2ft.	3ft.	4ft.	per sup. ft.
½in.	20	25/–	37/6	50/–	–/4
¾in.	20	12/6	18/9	25/–	–/2½
1in.	19	11/3	16/–	22/–	–/1¾
1½in.	18	9/–	13/6	18/–	–/1½
2in.	18	7/–	10/6	14/–	–/1¼

WEIGHT OF FENCING WIRE.

(Ironmonger's List.)

Gauge No.	Wt. Mile.	Yds. Cwt.	Brkg. Strain.	Weight of Fence Per Mile for								
				2 Wires			3 Wires			4 Wires			5 Wires		
	lbs.	yds.	lbs.	c.	q.	lbs.	c.	q.	lbs.	c.	q.	lbs.	c.	q.	lbs.
4	714	276	2197	12	3	0	19	0	14	25	2	0	31	3	14
6	495	397	1528	8	3	10	13	1	1	17	2	20	22	0	11
8	344	573	1060	6	0	16	9	0	24	12	1	4	15	1	12
10	241	819	741	4	1	6	6	1	23	8	2	12	10	3	1
12	142	1393	436	2	2	4	3	3	6	5	0	8	6	1	10

See advt., pp. 2, 10, 21, 24, 29.

Gal. Fencing Wire,	No. 8	... 19/– per cwt.	...	556 l. yds
	No. 10	... 20/– per cwt.	...	882 l. yds.
	No. 12	... 25/– per cwt.	...	1333 l. yds.
Gal. barbed Wire	No. 12	... 25/6 per cwt.	...	450 l. yds.
	No. 14	... 27/6 per cwt.	...	700 l. yds.

GAL. FENCING WIRE (PLAIN AND BARBED).

SPACING TABLE.

Distance apart	NUMBER OF POSTS PER MILE.										
	9ft.	10ft.	12ft.	14ft.	16ft.	18ft.	20ft.	22ft.	27ft.	36ft.	45ft.
Posts	587	528	440	378	330	293	264	240	196	147	118

Example of how to estimate Cost of Fencing.

Approximate costs per mile of girder steel fencing, consisting of five plain wires and one barb, with standards 21ft. apart, and two droppers between each standard. Height of fence, 3ft. 9in.

Appx. weight. Cwt.	q.	lbs.		Melbourne. £	s.	d.
15	0	0	256 Steel Girder Posts, 5ft. 6in. long, £8 per 100	20	0	0
3	0	0	10 do. Straining Posts, with sole pieces, 9/– ea.	4	10	0
0	2	0	4 do. do. Stays, with ground plates, 8/–	1	12	0
6	2	0	480 do. do. Droppers, 40/–	9	12	0
16	0	0	16 Cwt. No. 8 Gal. Wire, 19/6	15	12	4
4	0	0	4 Cwt. No. 12 Barb Wire, 25/6 gal.... ...	5	2	0
			Labor, erecting, 2/– per chain	8	0	0
45 cwt.				64	8	4
			Carriage to be added at say 40/– per ton ...	4	10	0
				£68	18	4

For wooden or other posts, if used, leave out the first three items, and add cost.

WIRE NETTING AND FENCES.

When erecting a new wire fence arrange for one of the wires to be 36in. from the ground, and bore the hole for wire 1in. from the side of the posts, thus prepare for 42in. netting, as it will stretch easily and neatly along the fence without bulging round each post.

To prevent netting from corroding dip the roll 6in. or 7in. in 2 parts of coal tar and 1 part kerosene, heated nearly to boiling point, and let dry before using. Block and tackle very handy.

BUZACOTT'S GAL. WIRE FABRIC FENCING.

Carter's Post Clamps, 25/– per 100.

Height ins. Per ft.	24	30	36	42	48	54	60
3in. mesh	–/8	–/9	–/10	–/11	1/–	1/1	1/2
2½in. mesh	–/9	–/9¾	1/–	1/1	1/2	1/4	1/6
1¾in. mesh	–/11	1/–	1/2	1/3	1/4	1/5	1/7
Ornamental	—	—	1/3	1/4	1/5	1/6	1/8

Prices per running foot, ornamental up to 10/3.

DONALD'S WIRE STRAINERS.

Each, complete, £1/2/6; Segments, each 1/6.

POST LIFTING JACKS.

	£	s.	d.
No. 1 (10 ton)	6	15	0
No. 2 (6 ton)	5	0	0
No. 3 (1½ ton)	1	0	0

CYCLONE SPRING COIL FENCE.

No. of Lines	Height, in.	Price per Chain s.	d.	Price per Mile £	s.	d.
5	26	6	9	23	10	0
6	36	8	9	31	10	0
7	36	9	6	34	0	0
7	40	9	9	35	0	0
8	30	10	3	36	10	0
8	44	10	6	38	0	0
9	36	11	3	40	10	0
10	42	12	3	44	0	0
11	49	13	0	46	10	0
12	58	14	3	51	0	0

Barb Wire—

1 reel weighs 1 cwt. net.

12 gauge thickset, 450 yards to cwt., or 4 cwt. per mile.

14 gauge thickset, 700 yards to cwt., or 2½ cwt. per mile.

Steel Barbed Wire, 3in. spaced—

Gauge No.	Weight per Mile c. q. lbs.	Yards per cwt.	Price per ton £ s. d.	Price per Mile £ s. d.
14	2 0 19	810	20 10 0	from 2 4 6
12	2 3 15	610	19 0 0	

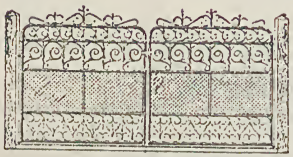


Fig. 170.

BUZACOTT'S DOUBLE ORNAMENTAL GATES.

Height, 4ft. 6in., width, 8ft., 10ft., 12ft.

Fig. 170. SINGLE GATES.

Height	3ft.	3½ft.	4ft.
Wide opening	...58/–	65/–	73/–
Plain	20/–	22/–	24/–

Steel Girder Dropper—

	£	s.	d.
30in. long, punched for wires, and slot at top for barb...	1	17	6
"**King-loc**" Dropper, 30in. = 134lbs. per 100... ...	1	10	0
Extra strong Dropper, 45in. = 250lbs. per 100... ...	2	0	6
Page's Simple Dropper, 42in. = 40lbs. per 100 ...	2	16	0
7-tongue do. do. 42in. = 75lbs. per 100 ...	1	0	8

Post Boring and Mortising Machines, with chisels and bits, £20. Post Boring Apparatus, 38/– to 50/–. Fencing Boxes, all iron, 6/– each. Wire Straighteners, 8/– to 25/– each.. Earth Borers, for fencing posts, 3 sizes, viz. :—7in., 21/–; 9in., 25/–; and 12in., 40/–.

Labor, erecting posts erected and bored, 2/– each; Dropper, 6d. to 10d., at 2/– per hour.

Federation Droppers (in bundles of 50)—

Punched for 5 wires, 15/– per 100; 6 wires, 20/– per 100.

Auto-Screw Corrugated Steel Droppers, per 100 (at Sydney)—

15in., 17/6; 25in., 24/–; 34in., 30/–; 46in., 42/6.

5ft. Standards, 600 angle steel, 1½ x 1½ x ⅜ = 400 per ton; f.o.b. Brisbane, 95/– per ton.

BUZACOTT'S GALVANIZED CRIMPED DROPPERS AND LOOPS.

Per 100.

Length	6G.	4G.	Length	6G.	4G.
28in.	9/–	11/6	40in.	12/6	16/6
32in.	10/–	13/–	42in.	13/3	17/6
36in.	11/–	14/6	46in.	14/3	19/–

Loops for fastening, 6d. per lb. (200 = 1lb.).

PLANT AND TOOLS.

MACHINERY AND APPLIANCES.

Present list of prices attached for portion of contractor's plant and tools not referred to previously throughout this work. For the **convenience of contractors** and **not for the purpose of advertising firms.**

Adzes, Fencers', 6/6 ; 6in. Railroad, 10/6.

Augers.—Post-hole Digger (Hurd's), 6in., 18/– ; 9in., 25/–.

Axes.—Squaring, 12in. blade, 9/– ; Collins & Kelly's, 5lb. handled, 4/– ; Mortise Axes, double end, 10d. per lb.

Hatchets.—Lath and Shingling, 1/9 ; Claw, 2/3 ; Carpenter's Bench, 4in., 2/2 ; 6in., 4/–.

Asphalt Cauldron, 20 gallons, on wheels, £15.

Barrows.—Navvy, wood, with wrought iron wheel, 40/– to 60/– each. Detachable Water Barrow, 15 gal., £6 ; 30 gals., £8.

Tubular Street Barrow, 70/– to 80/–.

Concrete Barrows, Steel, 80/–.

Brick Carts, £25 to £35 ; Cart Harness, £6/10/– ; 4-wheel Tray Waggon, £40 to £60 ; Spring Cart, £15.

Buckets.—Galv., 3 gal., 18/– per doz. ; 5 gal. (strong), 40/–. Round Well Galv. Bucket, with valve in bottom, 40 gals., 84/– ; 25 gals., 75/–. Patent Fire Buckets, 45/– per dozen.

Breast Drills, 3 jawed chuck to ½in., fast and slow, 32/–.

Chain Drills, 22/– ; wall drill, £8 to 2in. bits ; £4 to 1in. bits

BLACKSMITH'S PLANT.

Anvils, 28 to 48 lbs., £5 per cwt. ; 1/3 per lb. Forge tools, per lb., 2/–.

Bellows.—(Blacksmith's), 18in., 50/– ; 24in., 70/– ; 30in., 115/– ; 36in., £8 ; 42in., £12. **Tue Irons,** 6/– to 8/–. Water Tue Iron, 1/– to 18in., 30/– to 45/–.

" Buffalo " Electric Blowers, £25.

Steel Contractors, 210lbs. weight, £14.

Rivet Forge, hand, £10 to £11 10s.

Vyces.–Leg Vyces Parallel, Parkinson's, 3½in. jaw, 50/–.

Tongs.—3lb. each, 1/9 to 2/– per lb.

Swage Blocks.—48/– per cwt.

Anvil Tools, 3 to 5 lbs., at 1/6 lb.

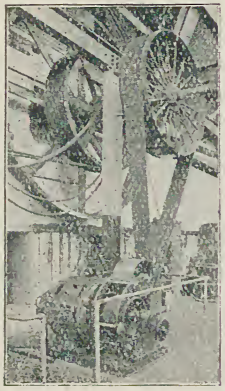
Hand Lever Shears, £9 ; Punch, £11.

CRAB WINCHES.

With Brakes	Load cwt.	Single Purchase £ s. d.	Double Purchase £ s. d.
To lift direct	16	10 0 0	12 0 0
" "	20	10 0 0	13 10 0
" "	25	12 0 0	16 0 0
" "	30	14 0 0	19 10 0

50 cwt., £25 ; 60 cwt., £30 ; 80 cwt., £40

30 cwt. Single Purchase Crab Winch with 2 and 3 sheave blocks will lift 3 tons.



See advt., page 34.

SINGLE LEATHER BELTING.

Width—Inches (Per foot run)	1½	2	2½	3	4	5	6	8	10	12
Light grade, ⅛in. thick ...	-/8	-/11	1/1½	1/4½	1/10	2/3½	2/9	3/8	4/7	5/6
Heavy grade, 3/16in. thick ...	-/9	1/0½	1/3¾	1/8	2/4	2/11	3/6	4/8	5/10	7/-
Extra heavy grade, ¼in. thick	1/1½	1/6	1/10½	2/3	3/-	3/9	4/6	6/-	7/6	9/-

DOUBLE LEATHER BELTING.

Light, ¼in. thick	1/4	1/10	2/3	2/9	3/8	4/7	5/6	7/4	9/2	11/-
Heavy, ⅜in. thick	1/6	2/-	2/6	3/-	4/-	5/10	7/-	9/4	11/8	14/-
Ex. Heavy, ½in.	2/3	3/-	3/9	4/6	6/-	7/6	9/-	12/-	15/-	18/-

THREE-PLY.

Heavy gr., 9/16in. thick	3/6	4/4½	5/3	7/-	8/9	10/6	14/-	17/6	21/-	

PATENT DOUBLE-EDGED LEATHER.

Price per foot ...	1/8	2/1	2/6	3/4	4/2	5/-	6/8	8/4	10/-	

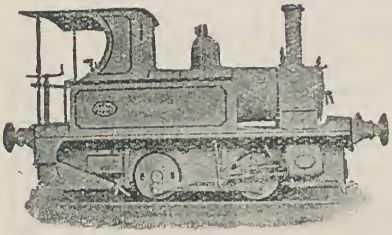
BEST QUALITY BALATA BELTING.

Width—In.	1½	2	3	4	5	6	7	8	9	10	12
3ply. p. ft.	1/1	1/5	2/1	2/10	3/8	4/5	4/11	5/11	7/-	8/-	10/-
4-ply p. ft.	1/5	1/10	2/10	3/9½	4/9½	5/11	6/11	8/6	9/6	10/8	12/8½
5-ply p. ft.	—	2/4	3/6	4/8	6/-	7/5½	9/-	10/6½	11/4	12/4½	14/5
6-ply p. ft.	—	—	—	—	7/3	8/9	10/9	13/4	14/8	15/11	19/-
8-ply p. ft.	—	—	—	—	—	—	—	17/-	19/-	21/4	25/5

Hammers.—Carpenter's, to 3/9 ; Slaters', 3/9 ; Bricklayers', 2/6. Sledge, S. & D. face, 7lbs. and up, 5½d. per lb. Drill Hammers, 6d. Quarry Mauls, per lb., 6d. Napping, 1¾lbs., 1/5 ; 2lbs., 2/–. Engineers' Ball Peins, without handles, ½lb., 6d. ; 1lb., 8d.

Friction Hoist for Belt Drive, with pulley to lift one ton, 90 feet per minute. Price £55.

STEAM LOCOMOTIVES.



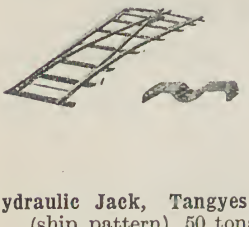
£140 per ton of total weight. viz., 10 ton Locomotive, £1,400.

Main Line Locomotive, £160 per ton weight.

Side Tip Trucks.

one cub. yd., 2ft. gauge ...	£16	0	0
¾ cub. yd., 2ft. gauge ...	£15	15	0
½ cub. yd., 2ft. gauge ...	£15	10	0

(*See Advt., p.* 19).

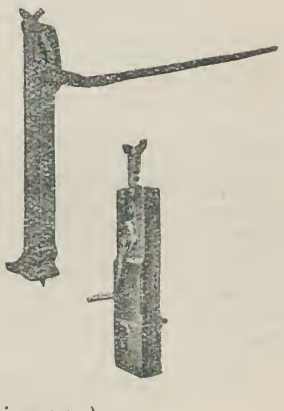


Light Steel Rails, 14 to 30lbs. per yd., with fish plates, bolts and nuts, rail or bridge, £16 per ton.

	£	s.	d.
Hydraulic Jack, Tangyes' (ship pattern), 50 tons each	30	0	0
Ditto, lift from foot pedestal, 50 tons each ...	25	0	0
Trewhella Bros. Pat. Lever, for lifting posts, boulders, rolling logs—			
To lift, single purchase, 2½ tons, weight 53lbs.	4	0	0
dble. purchase, 4 tons, weight 65lbs.	6	15	0
special, 6 tons, weight 79lbs.	9	0	0

To lift 8 tons, £10 ; 10 tons, £12.

(With automatic lowering gear.)



Trewhella Hand Monkey Winch Grabber, or Forest Devil, for pulling down trees with wire ropes.
Power—12 tons direct from drum, and 24 tons with snatch block.
Weight of plant, 500lbs., price, equipment complete ... £26 0 0
Ditto, with horse grabber and full equipment ... £45 0 0

LADDERS.

Heavy, Bricklayers' Oregon sides, H.W. rungs, bolted, 2/6 per foot.

Medium, Plasterers and Carpenters', ditto, bolted, 2/– per rung.

Painters' and Stock Ladders, Oregon sides, H.W. rungs, riveted—

10ft.	15ft.	20ft.	30ft.	40ft.	50ft.
16/–	22/–	30/–	56/–	65/–	75/–

Extension Step Ladders, 5ft. to 8ft., 15/6; to 10ft. to 18ft., 30/–.

Trestles for Paperhangers, 6/6 per foot.

SCREENS—CONTRACTORS AND BUILDERS'

Fig 61.

In Wood Frame, very strong. Any size made to order.

Mesh, inches	...	...	¼	⅜	¾	1
Each	...	...	37/6	36/–	34/–	30/–

Shovels, Navvy, D.H.S.M., 6/3 to 8/–.
Shovels, post hole, 6/6. Spades, 7/–. Picks, 5/6.

STEEL.

Steel Quarry Wedges, 44/– per cwt., or 6d. per lb.

BALLAST ROLLER.—Can be loaded with Water or Sand.

Width and Diam.	Empty c. q. lbs.	Weight Full c. q. lbs.	Price £
18 x 18in.	2 2 0	3 3 0	7
21 x 21in.	3 1 0	5 1 0	9
24 x 24in.	4 1 0	7 0 0	10
27 x 27in.	6 2 0	10 0 0	14
30 x 30in.	8 2 0	13 2 0	20
30 x 30in.*	9 0 0	14 0 0	26

*With both shafts for pony and handle for manual power.

LIGHTING, HEATING, FIRE RESISTING, REFRIGERATING.

LIGHTING.

For Country Residences.

ACETYLENE GAS COMBINATION GAS GENERATOR AND PURIFIER PLANTS.

Exclusive of Pipes and Fittings for Lights.

The present price of Carbide is from 4d. per lb. or 33/– per cwt.

One pound is said to supply a light equal to 25 candle power for six hours' duration.

Capacity for 6 hours.	Cost per hour £ s. d.	Carbide per hour	Capacity for 6 hours.	Cost per hour £ s. d.	Carbide per hour
6 lights	17 5 0	½lb.	20 lights	33 10 0	2lbs.
10 „	21 5 0	1lb.	30 „	48 10 0	3lbs.
15 „	23 10 0	1½lbs.	50 „	75 0 0	5lbs.

AIR-GAS PLANTS.

For Lighting, Heating, Cooking.

The mixture called Air-Gas is said to contain 95 per cent. of air and 5 per cent. of petrol vapour; it is also said to be non-explosive. It gives a brilliant white light when used with special small incandescent burners and mantles; and a blue non-luminous flame, or vaporous heat, when used for stoves and heating.

Cost of burning 5 lights of 60 c.p. burners at 1d. per hour, or a 40 c.p. light burning 25 hours cost 3d.

The **motive** or driving power is by automatic regulated weights, which are wound up daily like a clock, the average unwinding of which is about 4ft. 6in. per hour, according to consumption more or less.

AIR-GAS PLANTS, Complete (Price f.o.b.).

Plants, 10 lights of 60 candle power, £26; 20 lights, £40; 30 lights £50; 50 lights, £60; and 100 lights plant, £80; 200 lights plant, £153,

Suitable for homesteads, churches, laundries, factories, &c. Several makes of Air-Gas plants are on the market, each claiming advantages.

See advt., pp. 7, 10, 13, 23, 29.

"WIZARD" HOLLOW WIRE LIGHTING AND COOKING SYSTEM.

Benzine or petrol vapour is conducted from a "Compressor" through a fine copper tube or wire to the different positions of house required, using special burners and mantles, and cost from £50 to £60 upwards to instal; upkeep, 2/– per week average, 20 light machine. The cost of installation is extremely low and the upkeep much less than electricity, coal, gas, acetylene or kerosene.

An efficient cooking stove or a gas ring can be used. This system is made in Australia, being specially designed to cope with our climatic conditions.

Enquire Depot, 283 George St., Sydney (opp. Hunter Street.

Brilliant Search Light, for fixing on human head, with acetylene, automatic; small portable generator, each 58/–.

100 c.p. Pendant Light, complete, consumes 1 gal. benzine in 60 hours, price £5.

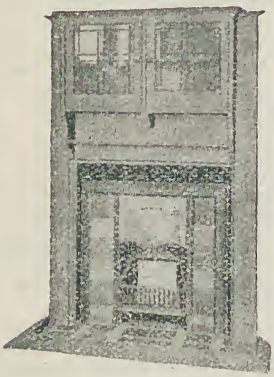
Kerosene Blizzard Hand Lantern, 7/6 each.

PETROL AND KEROSENE GAS-BURNERS.

Contractors' Portable Petrol Gas Lamps, for outside works—Small, 10/–; with handle and cover top, 3 point capacity, 23/– each.

HEATING.

COOKING OVENS AND STOVES.



Silky Oak Cabinet Mantles, £16.

Grates, for fuel, from 63/– upwards.

Kerosene Barrell Room Heater, 30/–; **Perfection** Ovens, Stoves Cabinets, 32/– to 62/–; Primus, 17/6

Colonial Ovens, 18in. x 12in. x 16in. deep, 32/6; 27in. x 14in. x 16in., 56/–; 30in. x 16in. x 14in., 55/–.

The above with side trays in iron, extra 3/–.

Add for setting above, from 20/– each.

"Younger" Stoves, 16in. x 12in. x 12in. single ovens, from £7 10s. to £12; 22in. x 18in. x 17in., double ovens, &c., £16/10/– to £45.

Metters' Early Kooker (new line) enamelled fuel stove, £24 to £27.

K.F.B. Wedgwood fuel stove, c.i. sides, £7/5/–.

Pacific, with boiler, £13/10/–.

Malleys' and Metters' Cottage Stoves, for 7 persons, from £4/15/–; extended plate, extra 20/–.

Kudos and Dover, £5/–/–; with extended plate, £9/10/–.

See advt., p. 29.

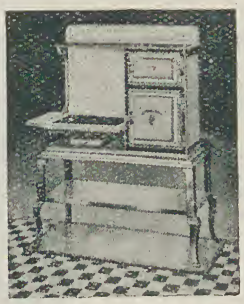
Ward's Stoves, from £5/15/– upwards.

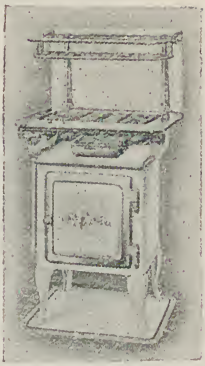
"Allington" Top Fire Stoves, for wood, £6/5/– to £8.

Wood Mistress, £7 to £9.

See advt., p. 10.

GAS COOKING STOVES.





K.F.B. Gas Stoves, enamelled steel plated, nickled parts, aluminium trays, and top cross plate racks, £18.
See advt., p. 29.

Metters' Pat. Gas Stove, double ovens, from £14/15/– to £20.

Metters' Side Ovens, plate rack, £25, enamelled.

C.I. Camp Ovens and Lids, 8in., 5/6; 9in., 5/9; 10in., 6/3; 11in 7/6; 12in., 8/–; 13in., 9/–; 14in., 10/–; 15in., 11/3; 16in., 13/9; 18in., 18/9; 20in., 21/9.

C.I. Portable Frames, with copper, 10 gals, 58/–; 16 gals., 65/–.

Japanned Iron Framed Copper Boilers, 10 gals., 40/–; 16 gal., 43/–.
See advt., p. 10, 23, 29.

"Hecla" Electric Hot Water Heater, continuous service, automatically regulated to one temperature; main reservoir of tinned copper for domestic use of water.

Size	Power per hour.	Yield			Price £
10 gal. consumes	120 watts	10 gals. at 160 deg.		in 24 hours	17
15 gal.	200 watts	15 gals.	do.	do.	18
30 gal.	400 watts	30 gals.	do.	do.	25
50 gal.	600 watts	50 gal.	do.	do.	32
70 gal.	800 watts	70 gals.	do.	do.	37/10

Cost of electricity, from 5/– to 28/– per month.
See advt., pp. 22, 23, 29.

The 'Briar" Continuous Gas Water Heater Wall Bracket regulates light itself. When water is drawn off, it automatically lights itself, brings the water to boil again, and then shuts off all the gas except a pilot which keeps the water at the boiling point.

Agents: Shanks, Melbourne. *See advt., p.* 10.

Metters' Automatic Water Heater (copper coil), price £27.

Metters' 3½ gal. per minute Continuous Service Water Heater, £48.

Cast Iron Incinerators, for burning rubbish and waste—size 29in. x 19½in. dia., 44/–; 33in., 00/–; 34in. dia., 60/–.
See maker's advt., p. 10, 23, 24, 29, 37.

AUTOMATIC HOT WATER SERVICE.

Malleys' "Thermo"—15 gal. capacity, supply 4 points, £30 ; 26 gal. capacity, supply 6-8 points, £40 ; 40 gal. capacity, supply 10-12 points, £50. Galvd. Iron Storage Tanks, to suit, extra.

"Esse" Coke Slow Combustion Heating Stoves, Majolica enamelled, in colours, £10 to £26.

In this patent heating stove the flues encircle th stove, and the full benefit of the heat is obtained and regulated by a patent regulator on the ashpan front, which controls the supply of air to the fire. Being of slow combustion, the refilling of fuel is necessary every 12 to 36 hours, according to size. The fire is raked by moving a bottom grate worked by a handle from the outside. The front of stove is closed entirely a mica panelled fire door showing the glow of fire. Where no recessed fireplace exists, it can be fixed flat against the wall with the flue pipe leading through only. *See advt., pp.* 22, 23, 29.

Electric Radiator, 40/- each.

FIRE RESISTING.

CELOTEX
INSULATING LUMBER

Celotex Insulating Lumber.

Extract from Catalogue.

Celotex insu.ating lumber is a **strong, extra light, rigid weather-proof building board** made from the long tough **fibres of cane.** In stock sizes, 8 to 12 feet long x 3 and 4 feet wide, one half to one inch thick. Weight, 12lbs. to 100 sup. feet 1 inch thick.

It is said to have a heat insulating resistance value of 0.33 B.T.U.S. per square foot, per degree Fahrenheit. Its strength is in the proportion of cane to other woods, and can be used for exterior or interior lining.

In working it, the same treatment as wood is used, as it can be cut, **planed,** or sanded, and afterwards **painted, stained, decorated** or left natural grey colour as desired.

It may be used **under** or **over floors, ceilings** and **walls** as a **sound quieting, substance** or as an **insulating** material against extreme heat or cold.

"Acousti Celotex" is also especially manufactured in **tile form,** with **cellular** and **plain** surfaces, in several types and sizes for **acoustical corrections** such as **quieting treatment** and echo, preventing of sound, superseding other materials, in **public halls, broadcasting studios, auditoriums, &c.**

The acoustical division of the Celotex Co. employs special advisory engineering service at the call of architects or builders for correction of sound.

See advt., p. 15.

ARMOURED SLIDING FIRE DOORS.
With Patent Self-Closing Apparatus.

These are made of three or four thicknesses of timber (according to size of opening), and are completely covered with Tinned Steel Sheets, put on firmly with shingle joint, lapped free to expand. Automatic release temperature clip.

By excluding the atmosphere from the wood, combustion is prevented, an exposure of several hours to the flames only resulting in the timber becoming carbonised to the depth of a fraction of an inch.

Price according to area, from £20 to £45.

Labor erection of doors and windows, each, from £2/10/–.

Fitting, each door, sliding or hung, from £3/15/–.

Automatic attachments, from £2.

See advt., p. 37.

Mica.—A marvellous mineral is Mica. Its capacity for splitting is amazing. It can be parted to the one-thousandth part of an inch, and it is stated by electricians that these films can withstand a voltage of 20,000. The value of Mica is largely dependent on its transparency, capacity of splitting, and non-conducting of electricity and heat. For all kinds of electrical work it is invaluable. It is the best of all insulators.

According to Dr. H. T. Jenson, Director of Mines, Queensland, a trial lot of inferior Mica brought from Alice Springs, Macdonald Ranges, brought 32/6 per lb. in New York. The present prices of cut clear Mica in sheets 2 to 3 inches thick, and 14 x 10 inches is 28/– per lb. Motor transport to Adelaide, of 19/– per cwt. added. The cost of mining, cutting and transport from Macdonald Ranges, Queensland does not exceed £250 per ton.

Steel Roller Shutters, 50 sq. ft. area, £17/10/– each; 100 sq. ft. area, £31/5/– each; 120 sq. ft. area, £27/10/– each.

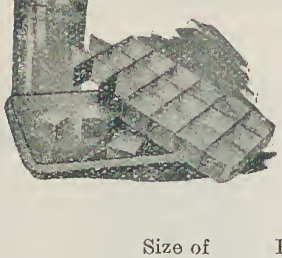
Garage Steel Roller Shutters, complete with fittings, standard sizes, spring balanced, painted 1 coat, 7ft. 6in. x 7ft. 6in., £16; 8ft. x 8ft., £17; 8ft. x 8ft. 6in., £18; 8ft. x 9ft., £19. Extra wicket gate centre, £6; side hung, £7.

CHEMICAL EXTINGUISHERS.

"**Waterloo**" **(Soda Acid) Chemical Fire Extinguishers,** on wheels, 40 gallon capacity, £120 each; 32 gals., £80.

"**Pyrofoam**" **(Foam Type) ditto.,** 2 ft. long x 6in. dia. Cylinders, 40 gal., £120; 32 gal. capacity, £80 each.

"**Simplex**" **Reversible Type,** weight 36lbs., size 21in. x 7in. dia. cylinders, £4/15/–; 2 gal. capacity.



	Size of Cabinet.	Price Refrigerator	Extra cost Maple Chest.	Cost Power
		£	£	d.
No. 510	49 x 37 x 22	120	40	2
No. 1015	63 x 40 x 22	140	58/10	3
No. 1520	65 x 52 x 23	160	69	4
No. 2028	73 x 51 x 23	180	84	5
No. 3645	81 x 69 x 25	195	92	5½

KELVINATOR FREEZER.

Kelvinator is an automatic electrical Refrigerator Machine for country homes, and consists of a reciprocating compressor driven by an electric motor with air cooled condensing coils mounted around the compressor and motor. This part of the plant is connected to the refrigerator cabinet by two copper tubes and the wires for the motor from local electric station. A thermostat control, placed inside the cabinet regulates the variation in temperature there and starts and stops the motor as required, maintaining an even temperature—from 40 degrees to 45 degrees Fahrenheit—inside the refrigerator. The only attention needed by whole plant is an occasional oiling.

The "Lister Lite" and **"Tudor"** is a self-contained electric generator for lighting, etc., with 2 to 3½ h.p. engine for 32 to 110 volts according to the cells. For 16 to 30 lights capacity.

ICE CHESTS.

	Height	Width	Depth			
No. 1	...38	21	14½ inches	2 Shelves	£9	12 6
No. 2	...41½	23½	17 inches	2 Shelves	£10	17 6
No. 3	...45	26	20 inches	2 Shelves	£13	5 0
No. 4	...31	33	20 inches	2 Shelves	£19	0 0
No. 5	...49	36	18½ inches	3 Shelves	£27	10 0
No. 6	...62½	63½	24 inches	8 Shelves	£50	0 0

THE PATENT DELAYGUE ICE STOVE.

System of Refrigerating.

From Wembley Exhibition, 1924-25 *and Sydney Agricultural Show*, 1926.

This simple freezer is a French scientific production consisting of two copper cylinders, sizes 9in. x 2½in. and 16in. x 6in. dia., enclosed, and connected syphon fashion by two tubes 1½in. and ⅜in. dia., the larger cylindrical chamber being for expanded hot-air, from the smaller enclosed cylinder. When placed over a primus stove or gas ring. When a certain heat, exactly, is arrived at a regulating melting plug automatically stops the gas. The large heated air cylinder is then plunged into water, and the cooling air rushes back into the smaller chamber through the different tube to that of entering, till it cools beyond zero. This smaller chamber is now the freezer, and acts as a block of ice.

No motor power required ; one heating per day on a primus stove or gas ring at a cost of one penny per day. ⅛ pint of kerosene is sufficient to work a small machine to freeze a 4 square feet ice chest. 8 square feet capacity, £30 complete.

Agent for Australasia : J. W. Glasby, Australia House, Wynyard Sq., Sydney.

Californian Pumps or Water Lifts, with endless chain and buckets, hand power, from £4 upwards.

"QUICKFRI" STEEL AND ASBESTOS LINED COOKING PAN.

It roasts, fries, bakes and boils. Saves 75 per cent. gas. Can be used on gas, oil or fuel stoves. A four course meal can be cooked in four minutes comprising fish, meat, potatoes, onions, fruit, fritters and cheese savoury, all put in the Quickfri together and actually touching, and yet one does not taste of the other, and each article retains its full flavour.

Prices : 25/– each to 60/– each.
Hotel size : 130/– each.
Complete with tripod and gas burner.

TO CLEAN WATER PIPES WITH POTASH.

Water pipes that are partly clogged may be cleaned by flushing them with a strong solution of water and potash. To introduce this solution, shut all faucets on the same branch, turn the water off at the cut-off, put the vessel containing the solution under the faucet spout, and open the faucet. The spout touching the liquid. Water draining from the branch through the drain plug causes a vacuum in the branch, which will draw the potash solution from the vessel into the pipes. The faucet spout must be kept under the surface of the solution until the latter is all drawn in or until the suction ceases.

PUMPS AND HYDRAULICS.

MEMORANDA.

To convert head in feet into pounds pressure per sq. inch, multiply by .434.

To convert pressure per sq. inch into head in feet, multiply by 2.31.

To find the horse-power in water, multiply the quantity in cub. feet per minute by the head of water in feet, and the result by .0016098. Result is based on an efficiency of 85 per cent. in the water wheel.

Doubling the diameter of a pipe increases its capacity four times.

Theoretically, water can be raised by suction 33 ft., but practically only 26ft. to 29ft.

Height of tank being known, to find diameter of tank needed for any capacity: Divide quantity desired by .0034, divide remainder by height in inches, and obtain sq. root. The value thus obtained is the diameter in inches, divide by 12 to obtain diameter in feet.

To find capacity of tank in gallons: Square diameter in inches, multiply by height in inches, multiply by .0034, the product is the capacity in gallons.

ESTIMATING THE H.P. OF STREAMS.

Ernest Muller, A.M.I.M.E., consulting engineer, London, S.W., writes :—

"When calculating a number of horse-power of a stream, estimate the number of cub. ft. flowing in a stream per minute, multiply it by the distance the water has to fall, and then multiply this by 0.0014, and you will get the actual number of horse-power obtained by a plant with 75 per cent. efficiency.

"The figure 0.0014 is obtained as follows :—The weight of a cub. ft. of water (62.321), multiplied by efficiency (0.75), the total divided by 33.00 = 0.0014175."

1 **cubic foot** per second equals 374 imp. gallons per minute.

1 **cubic foot** of **fresh water** weighs 62.5lbs., and contains 6.232 gals.

1 **cubic foot** of **sea water** weighs 64.25lbs.

1 **cylindrical foot** weighs 49.08lbs., and contains 4.894 gals.

1 **gallon** weighs about 10lbs. 8 **gallons** measure 1 bushel.

SIZES OF PIPES FOR WATER.

Table of approximate suitable diameters of pipes for conveying different quantities of water. For short mains up to 200 yards long, the diameter of pipe is not of much importance, but when they exceed 200 yards in length the diameters given in this table are desirable :—

Gals. per min.	Dia. of pipe.	Weight of 100ft. c. q. lb.	Gals. per min.	Dia. of pipe.
½	½		60	4
¾	¾	0 3 0	100	5
1½	1	1 0 5	160	6
3	1¼	1 1 22	220	7
5	1½	2 1 10	300	8
10	2	2 3 2	450	9
15	2½	4 0 6	500	10
20	3	6 0 8	800	12

WATER WEIGHTS AND MEASURES.

One imp. gal.=277.274 c. in.
" " =.16 c. ft.
" " =10.00 lbs.
" " =4.537 litres.
One U.S. gal. =231 c. in.
" " =.133 c. ft.
" " =8.33 lbs.
" " =.83 imp. gall.
" " =3.8 litres.
One cub. in.=.00367 lb.
" " =.003607 imp. gall.
One cub. ft.=6.23 imp. gall.
" " =28.375 litres.
" " =.0283 cub. metre.
" " =62.35 lbs.
One lb.=27.72 cub. in.
" =.10 imp. gall.
" =.4537 kilo.
One cwt.=11.2 imp. gall.
" =1.8 c. ft.

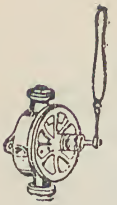
One ton=35.9 c. ft.
" =224 imp. gall.
" =1000 litres (approx.).
" =1 c. metre (approx.).
One litre=.22 imp. gall.
" =61 c. in.
" =.0353 c. ft.
One cub. metre=220 imp. gall.
" " =1.308 c. yds.
" " =61028 c. in.
" " =35.31 c. ft.
" " =1000 kilos.
" " =1 ton (approx.)
" " =1000 litres.
One kilo. of water = 2.204 lbs.
One vedro of water=2.7 imp. gall.
One eimer of water=2.7 imp. gall.
One pood of water=3.6 imp. gall.
One Russian fathom=7 ft.
One atmosphere=1.045 kilos. per sq. in.

A column of water 1 foot high = .434 lb. pressure per square inch.
A column of water 1 metre high = 1.43 lbs. pressure per square inch.
A pressure of 1 lb. per square inch = 2.31 feet of water in height.
One imperial gallon crude petroleum = 8.2 lbs. (approximately).
One ton petroleum = 275 imperial gallons (approximately).

THE PRESSURE OF WATER AT DIFFERENT HEADS.

(Per Square Inch.)

Head of water. ft.	Pressure. lbs.	Head of water. ft.	Pressure. lbs.
1 = ...	.433	100 = ...	43.3
2 = ...	.86	110 = ...	47.6
3 = ...	1.3	120 = ...	52.0
4 = ...	1.73	130 = ...	56.3
5 = ...	2.16	140 = ...	60.6
6 = ...	2.6	150 = ...	65.0
7 = ...	3.03	160 = ...	69.3
8 = ...	3.46	170 = ...	73.6
9 = ...	3.9	180 = ...	78.0
10 = ...	4.33	190 = ...	8.23
20 = ...	8.66	200 = ...	86.6
30 = ...	13.00	210 = ...	91.0
40 = ...	17.33	220 = ...	95.3
50 = ...	21.66	230 = ...	99.6
60 = ...	26.00	240 = ...	104.0
70 = ...	30.33	250 = ...	108.3
80 = ...	34.66	260 = ...	112.6
90 = ...	39.00	270 = ...	117.0

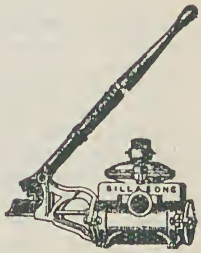


SEMI ROTARY PUMPS.

No. 1, 27/6 ; No. 2, 32/6 ; No. 3, 45/– ; No. 4, 47/6 ;
No. 5, 55/– ; No. 6, 60/– ; No. 7, 90/–.

"Billabong" Double Acting Force Pump.

For pumping water from shallow wells, dams, washing out boilers, filling small tanks, with the patent Cog Gear—so easy to lift a big volume with little effort. Gunmetal valves and brass valve seats, for £7/10/–.



EDISON'S DIAPHRAGM BILGE PUMPS.

Hand Power Suction Pumps.

For Water containing Sand and Mud.

No. 2—2½in.	Suction Pipe,	capacity	1800	gals.	per hour	...	£5	5 0
No. 3—3in.	,,	,,	4000	,,	,,	...	6	5 0
No. 4—4in.	,,	,,	6000	,,	,,	...	9	10 0

CENTRIFUGAL PUMPS.

These pumps, like the Californian pump and water lifts, will raise water mixed with sand or clay without injury to the pump.

They are made to work in a horizontal or vertical shaft with a pulley and endless band.

Suction pipes with elbow and foot valve, also extra shafting, can be had with pumps.

	Pulley.	Water per minute.	H.P. per ft. of lift.	£	s.	d.
1¼	2½ x 2½	17/25	.02	8	10	0
2	3 x 3	42/65	.05	10	10	0
2½	4 x 3	85/125	.08	14	7	6
3	5 x 4	125/170	.10	17	0	0
4	6 x 4	190/250	.12	25	0	0
5	8 x 6	340/420	.20	35	0	0
6	8 x 6	580/660	.35	41	0	0
8	10 x 6	750/1000	.45	65	0	0

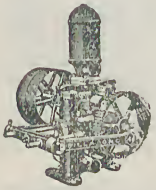
"BILLABONG" CENTRIFUGAL PUMP.

For Heavy Pumping.

This pump delivers enormous quantities of water. Suction and discharge can be taken from any angle. Fast and loose pulleys are provided, and an extended spindle for use with Electric Motors. In sizes from 1in. to 8in.

Side Suction, 1in., 50/–; 2½in., £7; 2in., £9; 2½in., £11; 3in., £13; 4in., £18; 5in., £29/10/–; 6in., £34.

PUMPS WITH FULL-WAY FOOT VALVES AND COMPANION FLANGES.



"BILLABONG"

Double Acting Piston Pump.

A powerful pump for use with petrol or kerosene engine. We fit this pump as a Sheep Spray Outfit, complete. Sizes from 2½in. to 5in.

Inside Diam. of Barrel	Length of Stroke	Inside dia. of suction and Del'vry Pipes	Gallons per hour not allowing for Slippage. Imp.	Amer	Weight in lbs. Approx.	Price £ s. d.
2½ inches	4 inches	1¼ inches	339	407	150	
3 „	5 „	1½ „	611	733	280	18 10 0
4 „	5 „	2 „	1086	1303	325	24 7 6
5 „	5 „	2½ „	1697	2037	500	28 0 0
						37 10 0

THE PULSOMETER STEAM PUMP.

A simple and cheap apparatus for raising water and other liquids by direct power or pressure of steam. A good feature of the Pulsometer is the simplicity with which the few wearing parts can be immediately replaced.

It will work on a constant suction without attendance, or as long as the steam and water are supplied to it. It requires no lubricant, oil, tallow, or packing, and needs no skilled attendance.

The Pulsometer will also raise water mixed with mud, sand, &c.

Sizes and Capacities.

No.	Steam Supply Pipe. Size.	Suction Pipe. Size.	Delivery Pipe. Size.	To Lift 15ft. approx. gals. per hour.	£ s. d.
1	¼in.	1½in.	1in.	600	16 0 0
2	¼in.	2in.	1½in.	1000	22 0 0
3	½in.	3in.	2in.	2500	30 0 0
4	½in.	4in.	2½in.	4000	40 0 0
5	¾in.	4¼in.	3in.	6000	50 0 0

THE HYDRAULIC RAM.

By Henry Lord, G.T.C.A.C., Lecturer in Agriculture, Sydney Technical College.

The Hydraulic Ram has proved itself extremely useful.

The principle on which it works is that a larger volume of water having a certain fall will force, under certain conditions, a smaller volume of water to a higher point than itself.

In estimating the amount of water that can be raised and discharged, a general rule is to estimate that, roughly, about one-seventh of the water used can be raised and discharged at a height five times as high as the fall, or one-fourteenth part may be discharged ten times as high as the fall, and so on in ratio as the height of the fall and point of discharge is increased or diminished.

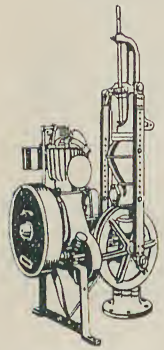
Take the volume of 25 gallons from a dam under a working head of 15 feet and 100 feet discharge = .0870 x 25 = 2⅛ gallons, a working head of 22 feet and 70 feet discharge = .2425 x 25 = 6 gallons.

These proportions will be modified by the diameter and length of the discharge pipe, as the friction will re-act against the effect of the ram. *See* Table.

Size of Ram.	Fall.	Size of Drive Pipe.	Length of Drive Pipe.	Elevation.	Size of Discharge Pipe.	Length of Discharge Pipe.	Quantity of Water d'lvd in 24 hours.
No.	Feet.	Inches.	Feet.	Feet.	Inches.	Feet.	Gallons.
4	20	1½		150	¾	900	800
5	11	1½	50	125	¾	1,250	850
5	23	2	119⅓	150⅓	1	864	1,632
6	10	2½	60	70	1¼	547	1,440
6	17	2	120	60	1½	550	4,800
7	8	2½	135	35	1¼	400	3,500
7	4	3	150	62	2 & 1½	1,250	1,680
10	6⅔	4	135	104⅔	2	1,510	1,700
6	5	2½	64	16	1¼	120	3,840
5	24	2	80	190	1	650	1,266
5	17	2	90	100	1	600	1,400
5	9½	2	50	40	1	380	2,880
6	13¾	2½	110	85	1¼	2,300	2,400
6	40	2½	200	400	1½	1,000	1,440
5	11½	2	56	105	1	650	960
5	27	2	100	242	1	1,100	760
6	26½	2½	85	102¾	1¼	1,993	3,000
5	27	2	130½	234	1	925	700
4	27	1¼	200	270	¾	600	800

No. 3, 105/–; No. 4, 120/–; No. 5, 140/–; No. 6, 180/–; No. 7, 376/–.

BUZZACOTT WIND MOTORS AND PUMPS.



When total Head is not over	Dia. of Pump Cylinder R'mended.	Approx. Delivery per hour
feet	inches	gallons
35	6	2000
50	5	1400
90	4	900
100	$3\frac{3}{4}$	790
125	$3\frac{1}{2}$	690
150	$3\frac{1}{4}$	590
200	3	500
250	$2\frac{3}{4}$	425
300	$2\frac{1}{2}$	350
350	$2\frac{1}{4}$	280
400	2	225
500	$1\frac{3}{4}$	170

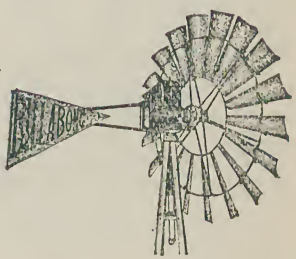
Steel Angle Ladders for Wells of Windmills, constructed of angle steel in sections 8ft. to 12ft. ; the steps are riveted to the uprights. Price, per foot, 2/6.

Steel Steps, to bolt on alternate sides of delivery pipes of deep well pumps as a means for descending wells. Price, each 2/–.

"BILLABONG" WINDMILLS.

Price List.

Size of Mill	Mills only (no Towers)	Complete with 4 Post Painted Towers and Anchor Posts		
		20ft.	30ft.	50ft.
ft.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
6	15/12/–	24/15/–	29/–/–	38/15/–
8	18/5/–	30/–/–	35/10/–	50/10/–
10	24/15/–	38/15/–	45/5/–	63/10/–
12	34/7/6	51/12/6	59/2/5	80/12/6
14	55/17/6	80/12/6	94/12/–	129/–/–
16	62/7/6	87/–/–	101/–/–	135/10/–



See advt., p. 10.

WINDMILLS AND TOWERS

Size.	Mill only.		With 30ft. Tower.	
	£ s. d.	lb.	£ s. d.	lb.
8ft.	23 0 0	250	41 10 0	789
10ft.	32 5 0	440	54 0 0	1147
12ft.	43 15 0	800	70 5 0	1595
14ft.	53 0 0	912	82 15 0	1707

ROPES AND BLOCKS.

The strength of the best Manilla ropes varies as much as rod or bar iron, portions of the same rope will sometimes vary 20 per cent. Exposure for two or three months to bad weather when the ropes are alternately wet or dry weakens them rapidly reducing their strength to one half. Tarring ropes also weakens them, the best preservative is to keep them dry and under cover.

Rope, Weight and Strength.

RULE.—For weight in pounds per fathom of three-strand hemp rope, square the girt and multiply result by .26.

Breaking strain in cwts., square the girt and multiply result by 5.6. Thus, a 3-inch rope would weigh 2.34 lbs. per fathom, and the breaking strain be 50.4 cwts.

Example $32 = 3 \times 3 = 9$.

$9 \times .26 = 2.34$, the weight in lbs. per fathom.

then $9 \times 5.6 = 50.4$, breaking strain in cwts.

Best Quality Manilla Ropes.

Weight fathom	14oz.	1¼lb.	2¼lbs.	2¾lbs.	3⅜lbs.	4¼lbs.	5½lbs.	6¾lbs.	7½lbs.
Girt in	2	2½	3	3½	4	4½	5	5½	6in.

WEIGHT AND STRENGTH OF SHORT LINK CHAINS.

	in.	in.	in.	in.	in.	in.	in.
Diam. of iron links	5/16	6/16	7/16	8/16	9/16	10/16	11/16
Weight per fathom ...	5½lbs.	8lbs.	11lbs.	14lbs.	18lbs.	23lbs.	28lbs.
Proof strain in cwts.	25½	36¾	51¼	65½	85	102	127
Diam. of links ...	¾	13/16	⅞	15/16	1	1⅛	1¼
Weight in lbs. per fathom	32	38	44	50	56	76	87
Proof strain in cwts.	147	177	200	236	268	334	408

To find the weight which ordinary short-link chains will bear with safety :—

Multiply the square of the diameter (reckoned in 16ths of an inch) by .035 ; the product will be the weight in tons. Thus, in the case of a ¾ inch chain ¾ = 12/16ths, and $12 \times 12 = 144$; then $144 \times .035 = 5.04$, say 5 tons—the safe working strain. If the squares are divided by 28, a similar result is obtained. Thus, 144 divided by $28 = 5.14$.

Example.—½in. chain (8/16)= $8 \times 8 = 64 \times .035 = 2.24$ tons which is the safe working strain of a half inch chain.

Galvanized Flexible Steel Wire Cords

Size Circumference	Construction	Approx. Weight per 100ft.	Approx. Breaking Stress	Price
Ins.		lbs.	lbs.	
$\frac{3}{4}$	6 x 24	8.	3400	3/– lbs.
$\frac{3}{4}$	6 x 12	6.	2500	
$\frac{5}{8}$	,,	4.4	1700	
$\frac{1}{2}$	,,	2.8	1100	
$\frac{3}{8}$	6 x 11	2.	780	
$\frac{5}{16}$	6 x 7	1.27	600	
$\frac{1}{4}$	,,	1.	400	

Extra Flexible Steel Wire Ropes

GALVANIZED.

Circum	Approx Diam.	Construction.	Approx. Weight		Guaranteed Breaking stress.	Dia. of barrel or sheave	Price Cwt.
			Per F'thom	Per 100ft.			
Ins.	Ins.		lbs.	lbs.	tons	ins.	
6	$1\frac{7}{8}$	6 x 37	35.4	590	104.3	36	
5	$1\frac{5}{8}$	,,	24.54	409	72.7	30	87/–
$4\frac{1}{2}$	$1\frac{7}{16}$	,,	19.98	333	58.2	27	
4	$1\frac{1}{4}$	,,	15.78	263	45.3	24	
$3\frac{1}{2}$	$1\frac{1}{8}$	,,	11.88	198	36.	21	91/–
4	$1\frac{1}{4}$	6 x 24	14.34	239	43.6	24	82/–
$3\frac{1}{2}$	$1\frac{1}{8}$	,,	11.28	188	34.2	21	
$3\frac{1}{4}$	—	,,	9.54	159	28.9	18	88/–
3	1	,,	8.04	134	25.	$16\frac{1}{2}$	
$2\frac{3}{4}$	$\frac{7}{8}$	,,	6.78	113	20.5	15	
$2\frac{1}{2}$	$\frac{13}{16}$	,,	5.7	95	17.2	$13\frac{1}{2}$	93/–
$2\frac{1}{4}$	$\frac{3}{4}$	,,	4.68	78	14.2	12	98/–
2	$\frac{5}{8}$	,,	3.6	60	10.9	$10\frac{1}{2}$	111/–
$1\frac{3}{4}$	$\frac{5}{16}$	,,	2.82	47	8.5	9	126/–
$1\frac{1}{2}$	$\frac{1}{2}$	,,	1.98	33	6.	$7\frac{1}{2}$	138/–
$1\frac{1}{4}$	$\frac{3}{8}$	,,	1.44	24	4.3	5	1/8lb.
1	$\frac{5}{16}$	,,	.96	16	2.6	4	2/1 lb.

It is repeated bending over the pulley that breaks the crown strands of ropes. The shorter the pitch of the spirals of wire and the finer the wire, the more flexible the rope. The pitch of the individual wires may be from 2in. to 6in., and that of the strands 6in. to 12in. For flexibility the cores both of rope and strands should preferably be of hemp. Mr. Biggart, who tested the strength of the wire ropes used in the building of the Forth Bridge, found that the fracture of crane ropes was most often due to bending round small pulleys, and says "that 75 per cent. of the ultimate tensile strength of the rope may be taxed by bending alone. The pulleys over which the rope is to be run should not be less in diameter than five or six times the circumference of the rope. The larger they are the better.

HEMP AND WIRE ROPES, COMPARATIVE STRENGTH, &c.

HEMP ROPE.		WIRE ROPE OF EQUAL STRENGTH.			
Girt in inches.	Lbs. weight p. fathom	Girt in inches.	Lbs. weight p. fathom	Breaking strain, tons	Working load, cwt.
2¾	2	1	1	2	6
3¾	4	1⅝	2	4	12
4½	5	1⅞	3	6	18
5½	7	2⅛	4	8	24
6	9	2⅜	5	10	30
6½	10	2⅝	6	12	36
7	12	2⅞	7	14	42
7½	14	3⅛	8	16	48
8	16	3⅜	9	18	54
8½	18	3½	10	20	60
9½	22	3¾	12	24	72
10	26	4	14	28	84
11	30	4⅜	16	32	96

Chains for Crab Winches, price per cwt.—Thickness of iron in link ¼inch. diam., £2/15/–; ⅝ inch diam., £2/5/–.

SELF SUSTAINING WIRE ROPE LIFTING BLOCKS.

1½ ton.	2 tons.	5 tons.
£8/10/–	£10/10/–	£15

For manufacturer, *see advt.*, *p.* 17.

PRICES OF HEMP ROPE.

In Coils, 120 fathoms.

Best Manilla, under 1in. dia., 152/–; over 1in. dia., 145/– cwt.
No. 2 Manilla Rope, under 1in. dia., 122/–; over 1in. dia., 115/– cwt.
No. 3 Flax Rope, Best, under 1in. dia., 101/–; over 1in. dia., 94/– cwt.
No. 3 Flax Rope, No. 2, under 1in. dia., 85/–; over 1in. dia., 78/– cwt.
New Zealand Flax Lashing, 1, 2, or 3, in 56lb. coils and 7lb. ball.

Circular Pit or Building Crane, to swing complete circle, to raise 2 tons, may be made with a 5 ton crab winch, crane post (hardwood 35ft. by 9in. sq.), Oregon jib, 25ft. by 9in. by 6in., with iron sheaves or wheels let into crane post and jib, ½in. chain, four 1½in. girt galv. wire rope guides, each 66ft. long, also 20 fathoms 2½in. girt best steel flexible wire rope, iron fittings, labor, &c., complete at a cost of about £78.

ROADS AND STREETS.

COUNTRY ROAD MAKING.

Macadamised roads require first of all a solid and drained foundation and a surface rolled as soon as the broken metal is laid to uniform grades and slopes.

Rolling before traffic regulates the life of a road.

ROAD CONSTRUCTION.

Notes from above by S. J. Hunning, I.E. (Aus.)

The cambered crown of all roads be standardised to a cross fall from centre to side of road 2 inches in 10 feet, and the width of tyre of vehicles to be proportionate to load to be carried, with axle bent down at ends to throw the wheel inclined inwards at bottom.

Extract from letter by S. Gordon Moore, Shire Engineer, Bendigo, Vic.

Reinforced bluestone concrete base with a bituminous surface is considered a first class road. Formed rolled macadam with hot bitumen to fill spaces between stones is 2nd class construction for heavy and rapid wear for city or suburban roads.

Main reinforced blue metal in 1923 concrete roads, 8 inches thick ; large areas, electric machine mixed and motor delivered material ; cost, from 25/– per sq. yd.

Wood blocks and cement, using old blocks, 27/6 per yd.

COMPARATIVE CONSUMPTION OF GALLON OF PETROL. Various Road Surfaces.

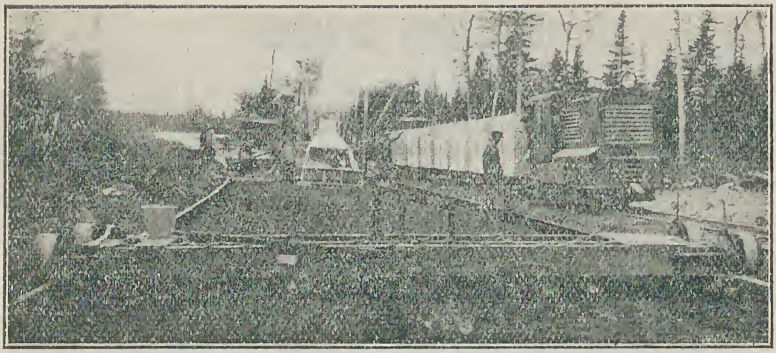
Extract on Road Problem by State Highway Dept., Illinois, U.S.A.

Engineering experiments made by Iowa State College shows the better type road materially decreases the consumption of petrol as per the following averages per gallon of petrol. Surface : Earth, 14 ton miles ; Bitulithic, 28.5 ; Gravel, 21 ; Brick, 29.7 ; Concrete, 31 ton miles per gal.

VITRIFIED BRICK FOR DURABLE AND CLEAN PAVING MATERIAL.

This kind of paving was laid in Geneva in 1903. Ohio has all brick pavings for about 27 years. The pavement is subjected to heavy traffic, 15 ton loads frequently traversing ; still in good order.

Brisbane Tramways filling between rails where suitable, are substituting Vitrified Brick for wood blocks.

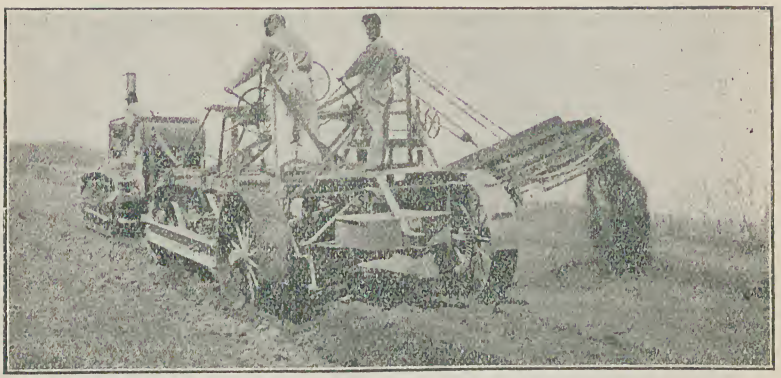


CONCRETE ROAD CONSTRUCTION.

In recent years the construction of concrete roads and surfacing on a concrete base in large areas has developed economical methods that will produce the greatest mileage of pavement in the least time and for the least money. Many shire engineers have adopted the system of a central proportionate plant, hauling the dry batches in 1½ or 2 c. yd. batch boxes on trolley trucks by a 24in. gauge portable track alongside of road, to a large mixer and distributor at working ends, swinging travelling arm across section of road for disposal of mixed concrete in position. An electrical driven surfacer or channel iron with steel scrapers working across the span of road on truck wheels and wooden or channel iron screed rails, which gauge the width, levels and grade of proposed road.

The portable 24 inch gauge track is first laid and extended as the work proceeds, sections of sleepers and rails unloaded from front end of trolley trucks, the motive power steam, electric or combustion engine pushing from central proportioning plant, both ways, until section is complete. The central receiving material plant is then transferred along track to centre of a section beyond end of finished road and work proceeds as before. The dry batch boxes are protected from weather and have hinged flap bottoms for loading, feeding skip of mixer.

For embankments, the side dump car, with side doors working on 2 feet rail or narrow gauge track and excavator or steam shovel, for "cuts" are now used for excavating works, viz., railroads, aquaducts, viaducts, bridge approaches, dams, reservoirs, brickyards. Size 1½ to 2 yards, trucks of 24 in. gauge, 4 to 5 cu. yd. capacity, truck 36in. gauge, but the smaller size are easily handled if it gets off the track on a soft "fill" or embanking.



COST OF ROAD MAKING, BENDIGO, VIC.

By S. Gordon Moore, Shire Engineer.

Bendigo Road Metal, Spalls, 4/– to 6/– delivered at Crusher; Crushing, 2/9 per c. yd. Carting and Spreading, Blending and Rolling added.

Blue stone Pitchers, 6in. thick, 12in. x 9in., 45/– per 100 at quarry. Channelling with same grouted in with cement, from 3 to 1, 3 stones (27in.) wide, cost £8 per chain, labour and material; 2 stones (18in.) wide, £6 per chain.

Road Tarring, labour, carting, spreading, sanding, including sand, which costs nothing, but cartage, say 3/– per load, average 7/8 per sq. yd.

Tar distilled costs 1/4 per gal., covering 4 to 6 sq. yds. Bitumen or Asphaltum costs 1/6 per gal. and covers 9 to 11 sq. yds. per gal.

BENDIGO MUNICIPAL BUILDING MATERIALS.

Harcourt Granite Building Stone, price 7/– per cub. ft., F.O.R. Melbourne, for stones up to 50 cub. ft.

Add 6d. per cub. ft. for every 10 ft. or part of 10 cub. ft. over 50 cub. ft.

Over 12 ft. long, add 6d. for every 2 ft. or part thereof.

White Fibrous Plaster Sheet, made locally, for building purposes (interior), lengths 6 ft. to 11 ft., widths 3ft. to 5ft., 2/– per sq. yd.

Concrete Slabs for Culverts, Manholes, etc.

3ft. 2in. long, 1ft. 7in. wide, 3¼in. thick cost 12/2 to make.
3ft. 2in. long, 1ft. 7in. wide, 2¾in. thick cost 11/3 to make.
3ft. 2in. long, 2ft. 1in. wide, 3¼in. thick cost 13/? to make.
3ft. 2in. long, 2ft. 1in. wide, 2¾in. thick cost 11/1 to make.
All are reinforced with ¼in. rods spaced 4½in. both ways.

Sandstone Kerbing 8in. x 18in., per lin. ft., 7/–.
Sandstone Guttering, 21in. x 9in. per lin. ft., 8/–
Trachyte Kerbing, 8in. x 18in., per lin. ft., 8/–.
Trachyte Guttering, 21in. x 9in., per lin. ft., 8/9.

Bluestone Kerb Gutter, two stones, 12in. x 8in., dressed and tool chamfered edge, per ft. run, 9/6.

1 cub. yd. of concrete will form 40ft. kerb 2in. x 2in. x 6in. or gutter 18in. x 4in., or 30ft. kerb 13in. x 7in.

Shrinkage, 8 to 6½ situ.

CONCRETE KERBS AND GUTTERS, 1925.

Wages Award, 2/0½.

Reinforced Gutter Crossings—

6in. x 3ft. 8in. long, per ft. run, 2/9.

15in. x 9in. x 3ft. 8in. long, per ft. run, 3/9.

Reinforced Troughing—

22½in. dia. x 14½in. deep x 4ft. 6in. long, per ft. run, 2/6.

Extra for ends, 6/– each; standards, 12/– each; plugs, 3/– each.

See advt., p. 16.

REINFORCED CONCRETE GUTTER CROSSING SLABS.

9ft. bridge, £3/3/–; 10ft. bridge, £3/10/–; 12ft. bridge, £4/4/–; 15ft. bridge, £5/5/–; 18in. gutter x 3½in. thick x 3 ft.

MUNICIPAL KERB AND GUTTERING.

Per North Sydney Road Making Council.

Actual practical working method, with hand machine mixer.

½ cement bag or 3 shovels (No. 5 shovel) cement.

5 shovels of sand.

9 shovels ¾in. blue metal.

or to each feed 2-4 gal. kerosene tins — 1 bushel.

Ordinary navvy barrow will carry 2 cub. ft. or 12 shovels of No. 5 size.

1 cub. yd. of concrete will make 40 ft. of gutter 12in. x 6in.

Before mixed, 8 cub. ft. will only make 6 cub. ft. concrete.

3 bags of cement mixed 3 : 5 : 9 will make 40 ft. of 6in. x 12in. kerb or 4in. x 18in. gutter, or 30ft. kerbing 7in. x 13in.

The best sand for concrete finish is the "wash" sand stone sand.

The coarser sand (crushed stone), being hungry, allows the water to run through the concrete too quickly and leaves a rough surface. Better to mix Sydney fine blown sand for a "fatter" mixture and a smooth result, or mix a small quantity of hydrated lime.

WOOD BLOCKING, GENERAL REMARKS.

Average, 50 blocks to square yard, close packed, ⅓ gall. tar dipping, ⅔ gall. dressing tar per square yard 3 11/15.

Cost tar, 7½d.; treated, –/8 per gal. Sydney.

Tar at gas works, 6d. per gall.

Floating Concrete Surface Roads. *See* Table Concrete Section.

About 8 cub. ft. and 3 bags cement covers 16 sq. yds. ½in. thick.

See Asphalt Section for Tar Paving.

Road Bed Steel Reinforcements. *See* Concrete Section.

It is evident that a surface of asphalt or tarred cushions for cement paths prevents wear and tear.

The Anzac Parade in 10 years shows no depreciation in thickness, surface becomes corrugated, but not broken, due probably to the presence of water underneath.

This locality was formerly the source of Sydney's Botany water supply, 1880, as seen in Centennial Park lagoons. Also the "Billy" and "Nanny" waterholes are all self filling.

Tarred gravel concrete, clean river gravel graded from 2½in. down and premixed with distilled tar, laid and rolled when cold, forms a reliable road for mild traffic. Maintenance and cost is considerably less than concrete.

STREET SANITARY DRINKING FAUCET.

For water pipe, complete with china ball, £2/5/–.

Sanitary drinking fountains with c.i. pipe and bowl flange, bolting to floor, gal. iron bowl, £5/5/–.

C.I. drinking pedestal fountain, 30 inches high, 14in. bowl, N.P. bubbling faucet, £7; pedal valve, £9.

Vitrious china pedestal and drinking head, with gal. iron waste to floor, self closing valve, £16/10/–.

Ditto, china bracket for wall, push button valve, £10/10/–.

MUNICIPAL ROAD PLANT.

All Steel Road and Contractors' Plow.—Four horse, 11in. cut, weighs 200lbs. Price £16/15/–. With pole, £35; with shafts, £39.

For further information, *H. D. Morrison, 96 Parramatta Road, also British Standard Machine Co, Sydney, and 516 Collins St., Melbourne.*

The Western Rail Road Plow.—No. 2 Plow, eight horse, 12in. cut, weight 225lbs. No. 3 Plow, ten horse, 10in. cut, weight 310lbs., £23. No. 4 Plow, twelve horse, 10in. cut, weight 410lbs., £25.

Contractors' Dump Waggon, See illustration. Price, from £95. For particulars, *see advt., p.* 13.

Giant Hardpan Plow. This Plow is designed especially for Hardpan, Cemented Gravel, Rock, Macadam and Frost. Price, £30.

Tumbling Tommy Scoop. Sizes 7, £9/5/–; 10, £16; 14, £21; and 18 cub. ft., £22.

Heavy Buck Scraper. Used for levelling ground, forming ditches and excavations. Sizes 4, 5 and 6ft. mouth. 6ft., £18; 5ft., £17; 4ft., £16. *See advt., p.* 19.

Western Standard Wheeled Scoop, half yard capacity. With automatic endgate, spring back hook, and patent axle sleeves. These scoops fill easier and carry their load to dumping ground without spilling. More economical to use than any other Scoop made, so contractors say.

See advt., pp. 13, 19.

GRADERS.

Little Western Steel Grader is a light road machine. The blade can be worked at any angle within the circle, or reversed so that the back of the blade may be used as a clod pulverizer.

Price, £112.

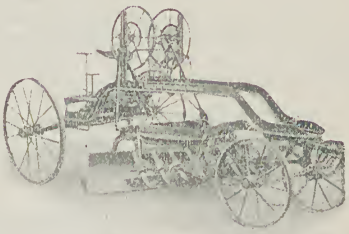
Standard Western Reversible Road Grader, is stronger than any other machine, and has all latest improvements. Back axle in two parts, tilting blade and removable axle sleeves, with double sand collar, direct draft, etc.

Price, £145.

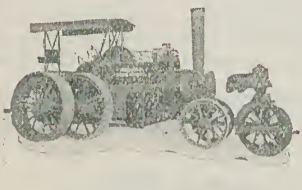
See pp. 13, 19.

Road Drag. Price £14.

Combined Scarifier and Grader. *See* illustration.



Eclipse Reversible Road Grader.



Eclipse Reversible Road Grader. Blade 5 or 6ft., £60. For two or four horses. The Eclipse 10ft. Firebrake is heavier and non-reversible. Price, £150.

Tractor, Roller, Scarifier and Stationary Engine in one. As Tractor, 7½ tons, capacle of tractions 8 to 10 tons, 6 m.p.h. ; Roller, 10 tons. Price and particulars, *see adat., p.* 13.

STREET WATERING GEAR.

Removable Tanks, with the necessary street watering equipment, are available for every type of Garrett. These can be attached or removed in a very short time. The photograph shows a Municipal Council's Waggon. Price, £1,600.

Price and particulars, *see advt., p.* 13.

Primary Cost of Different Types of Road Pavements.

LABOR, 1926 Conditions, 22- to 2/6 per hour Labor.

MATERIAL—Cement, 7/- per bag; Sand, 8/-

Type of Pavement.	Original cost per sq. yd.	Maintenance. Annual cost per sq. yd.
Concrete 9in. thick Reinforced ...	1 15 6	1 0
Woodpavement on Concrete base	3 0 0	3 0
Neuchatel Asphalt on Concrete base	2 11 0	2 1
BituminousAsphalt on Concrete base	2 6 0	3 0
Bituminous Asphalt Surface on exist. Macadam base	0 15 0	2 3
Tarred Metal ...	1 0 0	3 3
Tar Concrete ...	1 2 0	2 3
Macadam	0 19 0	3 0

CONCRETE PAVEMENT.

Average Net Cost.

	s.	d.
19in. existing macadam ...	8	6
2in. Ash Filling	1	0
4in. S.S. Ballast	2	3
9in. concrete paving ...	20	3
No. 9 B.R.C. Re-'forc. ...	3	6
Net ...	35	6
Annual maintenance of surface	0	4
Ditto of Pavement p.a. ...	0	9

WOOD PAVEMENT.

	s.	d.
25in. excavating in existing macadam	11	0
2in. Ash filling	1	0
4in. S.S. Ballast	2	3
9in. Concrete paving (no reinforcement) ...	19	0
½in. Floating	2	0
6in. Woodpaving	25	0
Net... ...	60	3
Maintenance p.a., Floating	0	9
Ditto Woodpaving	1	6
Ditto Topdressing	0	8

BITUMINOUS ASPHALT PAVEMENT.

	s.	d.
21in. Excavating	9	2
2in. Ash filling	1	0
4in. S.S. Ballast	2	3
9in. Concrete paving ...	18	9
No. 9 B.R.C. Fabric ...	3	4½
2in. Bituminous Asphalt, at £5 14s. a ton	11	6
	46	0½
Maintenance after 5 years' life	2/3.6	

NEUCHATEL ASPHALT PAVEMENT.

	s	d.
21in. Excavating,in existing macadam	9	6
2in. Ash filling	1	0
4in. S.S. Ballast	2	3
9in. Concrete Paving ...	19	0
No. 9 B.R.C. Fabric ...	3	6
2in. Comp. Asphalt	16	6
Price per yard	51	9
Maintenance...	2	0½
First cost	8	3
Comp. Asphalt	7	6
SCARIFYING AND RE-FORMING existing macadam	3	0
2in. Bituminous Asphalt ...	11	6
	14	6
Maintenance to undre surface	0	1½
Ditto to Asphalt surface ...	2	3½
Total per square yard ...	2	5

TARRED METAL PAVEMENT.

	Primary Cost s. d.	Maintenance. s. d.
15in. excavation, in old macadam ...	6 7	
9in. S.S. Ballast, 25 years	4 8	0 5.4
6in. Tarred metal and scgs, 5 years	8 10	1 9.2
	20 1	
Maintenance and Tarpainting, 5 years		0 11
		3 2

TAR CONCRETE PAVEMENT.

18in. Excavating in old macadam ...	7 11	
9in. S.S. Ballast, 25 years	4 8	0 6.
6in. Tarred Metal, with 15 per cent. bitumen, 10 yrs.	9 0	0 10.8
	21 7	
Average cost of maintenance and Tarpainting, 10 years		0 6
		1 11

MACADAM.

	Cap. cost. s. d.	Cost per sq. yd. per ann. s. d.
19in. Excavating in muck	7 0	
9in. S.S. Ballast, 25 years	4 8	0 5.6
6in. Metal and Scgs, 5 years ...	6 9	1 4.2
	18 5	
Average cost of maintenande and Tarpainting...		1 0
		2 10

ROADWAY CONSTRUCTION.
(Not Reinforced), per yard.

	s. d.
6in. deep	12 9
7in. deep	14 9
8in. deep	16 9
9in. deep	18 9

BLUE METAL CONCRETE ROADWAY.
(Exclusive of Excavation.)

	s. d.
Metal and Screenings, 1.53 ton, at 12/-	18 4
Nepean Sand, .34 tons, at 8/3...	2 10
Cement, 5.20 bags, at 6/- ...	31 2
	52 4
Timber, etc.	0 3
Removals on job, say ...	2 0
Labor, 6 hrs. at 2/4⅜ ...	14 2
Haulage, 1.60 tons, at 1½ miles	7 0
Supervision, etc.	2 0
Per cub. yard	77 9
Floating Surface (Labor only), .35 hours at 2/6 extra per sq. yd.	0 10½
Reinforcement with No. 9 B.R.C. Fabric	3 4½

ROADWAY CONSTRUCTION.
(Not Reinforced), per sq. yd.

	s. d.
6in. deep, say	14 0
7in. deep, say	16 1
8in. deep, say	18 2
9in. deep, say	20 3

BITUMINOUS PAVING ON EXISTING MACADAM FOUNDATION.
Per sq. yd.

	s. d.
Scarify and reform (inch screenings), old metal	3 0
Bituminous surface, at £5 9s. per ton	11 0
	14 0

Alteration of levels to be considered extra.

TAR MACADAM 6in. DEEP WHEN ROLLED.
(Exclusive of Excavation.)

	s.	d.
7in. Tar Metal, .22 ton, at 20/–	4	5
1½in. Tar Scgs., .05 ton, at 33/6	1	8
Labor in Spreading ...	1	0
Rolling	0	4
Haulage 1½ miles, .27 ton, at 4/4...	1	2
Supervision, etc.	0	3
	8	10

RESHEETING WITH 3in. TARRED MACADAM.

	s.	d.
Scarify and Reform ...	0	9
Tar Metal and Scgs. ...	3	3
Spreading Tarred Materials	0	6
Haulage and Material ...	0	8
Rolling	0	3
Supervision, etc.	0	3
	5	8

CONCRETE GATEWAYS 6in. THICK (Complete).
(Per sq. yd.)

	s.	d.
Metal and Scgs., .20 ton, at 15/6	3	1
Nepean Sand, .05 ton, at 12/–	0	7
Cement, .80 bag, at 6/– ...	4	10
	8	6
Plasterer, .80 hours, 3/1⅜ ...	2	6
Conc. Labourer, .80 hours, 2/4⅜	1	11
Carter, .80 hour, 3/2⅛ ...	2	7
	15	6

GATEWAYS.
(Per sq. yd.)

	s.	d.
4in. thick	11	6
6in. thick	15	6
8in. thick	19	6

CONCRETE ROADWAY (8in. METAL CONCRETE) COMPLETE.
(Per sq. yd.)

	s.	d.
Excavation in muck, 12in. deep, at 5/6 per cub. yd.	1	10
Haulage of excavation 2 miles, at 4/6 per cub. yd.	1	6
	3	4
Concreting, 1.6 hours at 2/3½	3	8
Floating, .36 hours at 2/6¼...	0	11
Watering, .26 hours at 2/2⅛	0	7
Hauling material 2 miles, .875 per T.M. at 3/1⅜ ...	2	9
Metal, .13 tons per sq. yd., at 16/–	2	2
Screenings, .13 tons per sq. yd., at 18/–	2	4
Sand, .16 tons per sq. yd., at 13/3	2	2
Cement, 1.16 bags, at 6/– ...	7	0
	24	11

Say 25/–

SUPPLY OF WOODBLOCKS.

		Av. Price. £	s.	d.
60% of 9 x 5 x 3	£18 1 6			
15% of 8	16 3 6	16	14	6¼
15% of 7	14 3 0			
10% of 6	13 6 6			
		Av. Price per 1000.		
60% 9 x 6 x 3	£21 15 9			
15% of 8	19 10 9	£20	3	11½
15% of 7	17 5 6			
10% of 6½	16 0 6			
Inspecting and Handling, say		0	15	0
		£20	18	11¼

	s.	d.
1926 Contract price = per sq. yd. ...	21	0

¾in. WOODBLOCKS. Per sq. yd.

	s.	d.
Woodblocks, excluding handling, 20/3; Tar, 1.4 gal. at 7d., 10d.	21	1
Mastic displaced blocks and costs, 30/– per sq. yd.		
Sand and Screenings ...	0	6
Cartage 1/2; Labor 1/6; Supervision and Sundries, 5d.	3	1
Per sq. yd.	24	9
Inspecting and handling blocks	0	9
Per sq. yd.	25	6

CONCRETE FLAGS, 2½in. THICK. Per sq. yd.

	s.	d.
Excavation 3in. deep, and cartage, 1/–; ½ yd. Materials, 7/6 at depot, 3/6; Cartage 1/– ...	5	6
Labor: making flags, carting to job, 5d.; Setting on sand, 1/6; Carting sand, 3d.	2	2
	7	8

BITUMINOUS SURFACE ON MACADAM.

21in. Excavation, 9/2; 2in. Ash filling, 1/–; 9in. S.S. Ballast, 4/8; 4in. Metal, 4/8; 2in. bituminous asphalt, 11/6; 31/– per sq. yd.

REWOODPAVING (For 1925 Annual Estimates).

	s.	d.
Excavation, old blocks ...	1	9
Clean, hack and floating ...	0	6
Make up concrete (av. 3in.)	7	0
Floating surface with 1in. cement	2	0
Blocking and topdressing:	s.	d.
Labor	1	9
Haulage	1	3
Tar, Screenings and Sand	1	3
Blocks	20	0
Total per sq. yd.	35	6

6in. WOODPAVING, Complete.

Excavation in metal and ballast, etc, 8/–; 8in. concrete, 16/9; Floating, 2/–; Woodblocking, 24/9; **Labor**, 18/8; material, 32/4, Total 51/6.

Supervision and Sundries on Jobs, say 1/6 of labor cost.

ESTIMATED COST OF WORKS, 1925.

Based on the following rates of wages per hour.

Laborers, 2/3; **Concreters**, 2/4⅜; **Tar Paviors**, 2/4½; **Carters**, 3/2⅛.

Excavation in Muck.

Labor, 2.44 hours at 2/3, 5/6; Haulage, 1½ miles, 6/6; Supervision and incidentals, 1/– = 13/– per cubic yard.

4/3 per sq. yd. 12in. deep = ½ load; 1/5 4in. deep = 1/6 load; 4¼ 1in. deep = .04 load; 2/1½, 6in. deep = ¼ load.

Excavation in Metal and Ballast.

Labor, 7/–; Toolsharpening, 9d.; Haulage, 1½ miles, 6/6; Supervision and sundries, 1/6 = 15.9 per cub. yd.

5/3 per sq. yd. 12in. deep; 1/9 4in. deep; 5¼d. 1in. deep; 2/7½ 6in. deep.

Haulage of Materials.

(by Carters drawing one way only hired Carters).

Loading and dumping, 10d. per ton load or 1/3 per cub. yd. of muck; Haulage per ½ mile, 1/2 per ton load, or 1/9 per cub. yd. of muck.

9in. Ballasting with Sandstone.

Materials, at 5/– per load, 1/8; Packing ballast, 1/–; Haulage, 1½ miles, 1/6; Rolling, 4d.;

Supervision and Sundries, 2d. = 4/8 per square yard.

9in. Ballasting with Hardstone.

Material at 10/– per ton, 3/–; Labor, 1/–; Haulage, 1/6; Rolling 4d.; Supervision and Sundries, 2d. = 6/– per sq. yd.

Blue Metal Concrete Foundation (exclusive of excavation.)

(per cub. yd.)	s.	d.
Metal and Screenings, 1.53 tons at 12/–	18	4
Nepean Sand, .34 tons at 8/3...	2	10
Cement, 4.80 bags at 6/– ...	28	10
Timber, etc., 3d.		
	50	0

Removals on job, say	...	2	0
Labor, 6.00 hours at 2/4⅜	...	14	2
Haulage, tons 1½ miles	...	7	0
Supervision, etc., about	...	2	0
		25	2
Per cubic yard	...	75	5

Reinforcement with No. 9 B.R.C. fabric, extra	...	3	2¾
Labor, fixing ...	...	0	1¾
		3	4½
Cartage to job from depot, about		3	6

SEPTIC TANKS.

There are many different systems dealing with the above matter varying not only in detail of construction, but claiming more or less efficiency as regards results and other advantages in price or compactness.

I append the following extracts from different writers of these systems.

BIOLOGICAL TREATMENT OF SEWAGE.

Sanitary Installation Coy. of Australasia, King St., Sydney, and Home Sanitation Ltd., Bligh Street, Sydney.

This system commences with a screening chamber constructed at the inflow end of the tank, so as to form a vortex with the inflowing liquor and carry the sewage, together with the inorganic matter in suspension across the face of the screen.

This action thoroughly breaks down the sewage into a weak state, and it then passes through specially arranged intake pipes to air tight septic tanks having a fall towards the intake.

SEPTIC TANKS.

Inside the tanks are fittings arranged to control the scum, which is formed upon the surface of the liquor in the tank by the bacteria, and which is of the utmost importance to the efficient working of the system. The bacteria utilised is that known as *Bacilli Coli Communis*, together with another specie known as *liquifaciens*. This scum formation has a twofold purpose. First, it is used by the bacilli to hermetically seal up the inside of the tank, as oxygen is fatal to their existence. Secondly, it forms the culture upon which the colonies thrive. It is therefore of the utmost importance in the design that no part of the tank should interrupt the unbroken formation of this scum, and that no inrush or outflow should cause an agitation or crack of the scum.

After the sewage, in a broken state, passes into the tank, large numbers of the *colonies* in a very rapid progress pass from the scum down through the liquor and immediately break up all the organic compounds, reducing them to their original elements, and the colonies then return to the scum.

The liquor which passes from the tank is then quite clear, but contains cellulous and other putrefactive substances, such as albuminoids in solution.

It is then further treated in special patent bacteria beds, consisting of distributors and a pebble media to increase the working surface.

After the bacteria beds have been working for a short perior there is formed on the surface of each pebble a coating of shiny growth. When dried it forms a stiff jelly containing masses of bacteria which rapidly absorb all the oxygen. It is this function that is used in the bacteria beds to procure the excellent effluent which is obtained, and the bacteria which you observe from the above, while they are the same species as cultured in the tank, thrive in the presence of oxygen in a different state, viz., *Aerobic*. As the effluent from the tank passes over the jelly growth on the stones, the putrefactive sub-

stances held in solution are subtracted, and the water left entirely free from any matter that will prove putrefactive even under incubation at a high temperature for long periods.

The result is that waste water is produced in which gold and silver fish are said to thrive without showing any sluggishness in their movements. This is admitted to be the highest scientific test any effluent could be submitted to.

Prices, approx., Sewage Tank and Bacteria Bed installed complete, within 20 feet from building.

For 3 persons, £45 ; 7, £55 ; 10, £64 ; 20, £80.

Dubbo Hospital, 5 years, upkeep £1 per annum.

THE EDMUNDS SEWAGE OXIDATION SYSTEM.

Nature Harnessed by Hygienic Science.

Nature disposes of all waste matter-sewage, decaying food, etc., by the agency of bacteria. So far as man's welfare is concerned, bacteria are of two types. Some like the cholera vibrio and the organism of diphtheria, produce disease. Others are beneficial in their action, breaking down foul waste matter and converting it into wholesome, inoffensive materials.

Bacteria of the latter type are always present in the *ground* and in *sewage* itself, carrying out their purifying action in conjunction with the oxygen gas which makes up one fifth of the air we breathe. **In this System a great advance on the old Septic Tank is effected by augmenting the oxygen supply** of the tank, thus allowing hordes of air-using bacteria (aerobes) to come into action and complete the liquifying work of the sewage organisms.

The use of disinfectants or deodorants is wrong, for it results in the destruction of those very forms of life which Nature has provided as scavengers ; owing to the rapidity of action of this system, a small amount of disinfectant entering the system will not upset it, unlike the older forms of septic tanks, being a concrete tank system.

Installed at Bendigo and city, our improved Anhydro **chemical** resolving system, installed at a very low cost. This requires some slight labor in upkeep, it is an advance on the pan system.

Prices by tender, Edmunds Bros. Pty. Ltd., H.O. 187A Flinders Lane, Melbourne. Branches : Sydney : Hoskin Buildings, 3 Spring St. Adelaide : Currie Street. Perth : Williams Street. Queen St., Brisbane ; Flinders St., Townsville. Maritime Buildings, Wellington, N.Z.

SEPTIC TANKS AND AERATORS.

By " Monier " Concrete Co. System.

Now the biological treatment consists in the passing of the sewage through the *Septic Tank and Aerator* so that their respective cultures of the micro-organisms may come into contact with and subject the sewage to the process of purification. If the effluent is to be discharged close to human habitation or likely to drain into watercourses, it is necessary to pass the effluent from the septic tank through an aerator to be aerated and brought into contact with the aerobic micro-organisms for further purification.

General Points.

The most suitable position for septic installations compatible with local conditions must be selected to enable the discharge of the effluent. If the ground has a slope, the installation should be arranged so as to discharge the effluent at the surface of the ground, where it may run into surface drains to soak into the soil or be used for irrigation purposes. If the ground be *flat*, the installation must necessarily be underground and the effluent must be discharged into underground drains of *rubble* or *perforated pipes* to soak into the sub-soil or to be collected into a tank if required for irrigation purposes, in which latter case the liquid will have to be lifted by meachnical means to the surface of the ground.

To ensure the proper working of the installation, the discharge of the W.C., the house and kitchen slops, bath and laundry water, should all pass through the same. A too-concentrated or too-diluted sewage are all unsuitable.

Disinfectant must be strictly excluded. Only *sanitary paper* should be used in the W.C.

The size of the drain pipe leading to and from the septic tank, we would recommend 6in. drain pipes for the former and 4in. for the latter. Care must be taken that nothing passes into the drain pipes larger than is permitted by the gratings provided at the gullies, also that the latter be cleaned out perodically.

Rain water from roofs and surface drainage from yards, &c., must be excluded from entering tank, a *grease trap* to intercept fatty matter till cooled ready for removal at frequent intervals.

Agents: *J.B. Reinforced Cement Co.*, 659 *Darling St., Rozelle, Sydney.*

MONIER SEPTIC TANKS AND AERATORS.

Quotations on truck Alexandria, or on any City Wharf.

No. of Persons	No. of Tanks	Cost of Tanks	No. of A'ators	Depth of A'ator Bed	Cost of Aerators	Total Cost of Installation
		£ s. d.		ft. in.	£ s. d.	£ s. d.
3	1	9 0 6	1	4 6	18 13 0	27 13 6
5	1	10 9 6	1	4 6	18 13 0	29 2 6
6	1	11 17 6	1	4 6	18 13 0	30 10 6
8	1	13 11 0	1	4 6	18 13 0	32 4 0
13	1	14 7 6	2	4 6	37 6 0	51 13 6
17	1	16 12 0	2	4 6	37 6 0	53 18 0
23	1	19 5 0	2	4 6	37 6 0	56 11 0
29	1	21 6 6	3	4 6	55 19 0	77 5 6
35	1	24 19 6	3	4 6	55 19 0	80 18 6
46	2	38 10 0	4	4 6	74 12 0	113 2 0
57	2	42 13 0	6	4 6	111 18 0	154 11 0
70	2	49 19 0	6	4 6	111 18 0	161 17 0

See advt., p. 16.

SANITATION FOR LOCALITIES WHERE THERE IS A SCARCITY OF WATER.

The "Somen Chemical System," tested and passed *by the N.S.W. Board of Health.* This consists of a pedestal seat with hinged lid, mounted on an iron tank. The standard model is 3 feet square by 18 inches in depth, containing 50 gals., but the size and shape can be made to suit requirements of individual cases.

Between the pedestal and the solution in the tank there is a cylinder with agitators attached to each end. This cylinder acts as a carrier, as it revolves gradually with each closing of the seat lid by a rachet wheel, and thus is constantly being washed and sterilised in the chemical solution. As the cylinder leaves the solution it is brushed by a rubber band, which assures its being perfectly cleaned. The agitators at each end of the cylinder keep the solution mixed up as required. The mechanism is simple and effective.

The contents of tank are emptied by simply opening a valve and allowing the liquid to escape into the affluent drain or covered pit provided for the purpose. The valve is provided with an overflow pipe which regulates the level of the liquid in the tank, but as no water is used except sufficient to make the solution, only a small overflow occurs, if any, during the periods between each recharge, which is done according to frequency of use. A necessary vent pipe from the tank is taken up above the roof which the system is installed under to carry away any fumes. The charging of the tank once in 3 to 6 months is as simple as the emptying.

The price of the system is £20 in Sydney. Installation varies, but generally the cost is approximately £1.

Agents: *Home Sanitation Ltd., No.* 1 *Bligh St., Sydney.*

MOIR'S AUTOMATIC CHEMICAL SEWERAGE SYSTEM.

Is similar in principle to the Somen System. The rachet wheel for stirring the effluent is controlled by opening and shutting door of the closet. The W.C. seat is directly over the vented curved top tank with 4 G.E. drain pipes to a leaching pit, 10 ft. long x 2ft. 6in. x 2ft. 6in. buried 2ft. underground.

The above systems were demonstrated at Sydney Agricultural Show, 1926.—C.E.M.

Varied prices on application, from £18 upwards.

Agents: *Sanitary Installation Co. of Australasia, King St., Sydney.*

WOOD STAVE PIPE.

(Extract from above Company's Catalogue 1926).

CONSTRUCTION.

" Pioneer" Machine Banded Wood Pipe is constructed of staves of selected oregon timber accurately dressed both sides with double " V " joints bound with No. 4 gal. mild steel wire and coated with asphaltum. Where pipes are used in salt marshy ground, or in soil of an acidulous nature, it is recommended that pipes be wrapped with hessian and coatings of asphaltum, to make an absolutely waterproof covering.

Wood Pipes are supplied in sizes from 2in. to 36in. in dia. and in lengths up to 16ft.

Various kinds of couplings for connecting the pipe together are used.

The Continuous Wood Stave Pipe is made of any dimensions from 10in. to 14ft. in diameter, and is always built " in situ," and the outside of the pipe is reinforced with steel rods, or bolted bands.

Electrolysis and the action of acids and mineral fumes have no effect on wood pipe. Resists frost better than any other type of pipe.

The Manufacturers claim the following advantages for wood pipe :

It is light, easy to handle, strong, and costs less for freight.

Is cheaply laid, requires no expensive caulking.

It is a wholesome medium for conveying water, has a great carrying capacity, which is never decreased by rust, tubercles, or growth. The cost ranges from 20 per cent. to 50 per cent. cheaper than cast iron pipe, depending on diameter and pressure heads.

It is easily and safely tapped and can be fitted to any connection.

LIFE RECORDS OF DIFFERENT WOOD PIPES.

Wood pipe has for centuries past been used as a means of conveying water. The original water supply of London consisted of about 400 miles of wood pipe, some of which remained buried for over 250 years, and when excavated were found to be in an excellent state of preservation.

The City of Philadelphia, U.S.A., had in use 45½ miles of bored wood pipes, supplying water to 500,000 people. These pipes were laid in 1801, and were replaced in 1901 by larger mains. Although 100 years old, the pipes were found to be in perfect condition, and most of them were re-laid in factories, etc.

The Elmira Water Company (New York) has several miles of wood pipes in use for over 55 years.

The Marshall Estate (Troy, N.Y.), supplies water through a 40 in. wood stave pipe built in 1865. which is still in excellent condition.

Denver, Col. U.S.A., has over 100 miles of service, some of which have been in use for 41 years and giving perfect satisfaction.

The first use of wood stave pipes in Australasia was in 1908, and hundreds of installations of wood stave pipes are in successful operation.

Many cities, towns and municipalities throughout Australia have installed wood pipe for water supply, hydro electric power development, irrigation, etc.

The Metropolitan Water, Sewerage and Drainage Board, Sydney, has approx. 150 miles of wood pipes in use, varying from 4in. to 32in. in diameter.

The Camden-Narellan line, 5 miles of 8in. dia. pipe, was the first laid in 1909. The Board has recently approved of duplicating this line with 5½ miles of 10in. wood stave pipes.

The Narrabeen Water Supply, installed in 1912, 4 miles of 5in. pipes, pressure of 250 ft. head. Sections of this line have been cut to instal new fittings and was found that the pipes were in perfect condition, although they are laid through salt marshy ground.

The Public Works Dept., Sydney, installed wood pipes in various country towns in New South Wales, the gravitation scheme main from Umberumberka Dam to the township of Broken Hill, 14½ miles of 18in. dia. pipes, withstands pressures up to 350ft. head.

The N.S.W. Government Railways have been using wood pipes for 15 years and at the present time has over 40 different installations in use, totalling over 70 miles in length.

In Victoria, the State Rivers and Water Supply Commission, supervises practically the whole of the water supply scheme carried out by various waterworks trusts, has recommended the use of wood pipes in approximately 80 towns in that State. The approximate total quantity amounting to over 200 miles, varying in diameter from 3in. to 36in.

In the States of New South Wales and Victoria alone, over 1000 miles of mine pipes have been laid during the past 16 years, both as main supply lines, and for reticulation purposes.

COST OF INSTALLING SYSTEM.

The proof of their 20 per cent. to 50 per cent. less cost, depending on diameter and pressure heads. Particulars copied from the company's catalogue.

Camden Water Supply.—The 4½ miles of 8in. wood pipe was installed in 1909 at a cost of £2,900 complete. The same dia. in cast iron pipe would have been about £6,000, approx. cost. The estimated cost of duplicating with a 10in. wood stave pipe line, 9,300 yards in length, was £17,500, laid in trenches, as compared to the cost of 10in. cast iron pipe, £26,700. NOTE: The Board accepted the tender for the installation of 10in. Wood Stave Pipe line.

Narrabeen Water Supply.—4 miles of 6in. diameter, 250ft. head wood pipe laid in prepared trenches, estimated, £2400 for wood, and weight, 100 tons. Weight: 300 tons, difference, 200 tons on 4 miles line. Estimated cost of 6in. cast iron pipe, £3,100. (1912 prices).

Based on Oregon at 18/–, Laborer's Wages, 1/–, Tradesman, 1/6. So according to increase of prices and recent 44 hour award for workmen, present prices of various diameters of pipe, different pressure heads, may be obtained from Lane Cove, N.S.W., or Footscray, Victoria, Factory Branches.

Comparative Prices W. & S. Board, N.S.W.—Average cost of 8in. upply mains per mile: Cast iron, £1,583; steel, ⅛in. thick, £1,118 wood, £836. (1912).

Mount Cameron Water Race Board (Tas.), 3,000ft. of 30in. wood stave pipe, laid in 1911 as a syphon, cost £1,602; laid in bearers in a shallow trench protected with earth covering throughout; comparative tender price for the above work in steel, ⅛in. thick, £3,000.

APPROXIMATE WEIGHT OF PIPES IN LBS. PER FOOT.

Inside Diameter In.	To Withstand Pressure 25ft. Head in Ft. Lbs.	50ft. Lbs.	100ft. Lbs.	150ft. Lbs.	200ft. Lbs.
3	4½	4½	4½	4½	4¾
4	5	5	5	5½	5½
5	9	9	9½	9½	10
6	9½	9½	10	10½	11
8	12	12½	13	13½	13½
10	16	16	17	18	18½
12	17	17	17½	19	20
14	20	20	21	22	23
16	27	27	28	29	30
18	29	29	30	32	36
20	39	39	43	44	47
22	45	45	48	51	54
24	47	49	53	56	56

The following quantities of each size pipe and the number of men required to instal the wood stave pipe only, in 8 hours, are taken from the catalogue of company as approximate only, and works out at 20/- per 8 hours present wage.

Speed in day of 8 hours			Approx. price per 100ft. s.	d.
4 men could instal	2300 of	3 inch pipes	 3	6
4 „ „	2000	4 „	 4	0
5 „ „	1800	6 „	 5	7
5 „ „	1500	8 „	 6	8
5 „ „	1400	10 „	 8	0
6 „ „	1200	12 „	 10	0
6 „ „	1000	14 „	 12	0
6 „ „	800	16 „	 15	0
6 „ „	600	18 „	 20	0
6 „ „	500	20 „	 24	0
6 „ „	450	22 „	 27	0
6 „ „	400	24 „	 30	0

Cost of excavation, supports or staying, functions and fittings to be added.

Special quotations given for quantities (¼ mile or over).

Prices up to 450 pressure head on application.
See advt., p. 8.

COMPARISON OF WEIGHTS.

Lbs. per foot.

	6in.	8in.	10in.	12in.
Wood Pipe, 50ft. press. head	9½	12½	16	17
Cast iron pipe	32	45	65	77

COMPARATIVE COSTS.

The cost of laying wood pipe is less than for laying any other class of pipe used for carrying water under pressure because there is no special labour or extra material used in making joints.

APPROXIMATE MEASUREMENTS OF WOOD PIPE.

OCEAN FREIGHTS, NUMBER OF FEET PER TON.

Size of pipe inter. dia.	3	4	5	6	8	10	12	14	16	18	20	22	24
40ft. per ton	147	103	84	64	43	30	23	18	15	12.4	10.4	9.	7.6

RAILWAY RATES ON WOOD PIPES,

N.S.W.—" U " trucks, 9 tons ; other trucks, " B " class. 1 ton lots, " C " class. Smaller quantities, " I " class.

VICTORIA.—For irrigation, 2 ton lots, " A " class. Lesser quantities, " B " class, smalls, min. For water supply, 1 ton lots, " B " class. Lesser quantities, " C " class, smalls min.

QUEENSLAND.—In 2 ton lots, " B " class. Smaller quantities, " I " class.

SOUTH AUSTRALIA.—Over 4 ton lots, " B " class. Less than 4 tons, but not less than 2 tons, " Bb " class. Less than 2 tons, " Cc " class.

WESTERN AUSTRALIA.—In 5 ton lots, " B " class. In 1 ton lots, " C " class. Smaller quantities, " I " class.

TASMANIA.—Minimum, 4 tons, rate and a half, " D " class. Smaller quantities, " E " class.

CARRYING CAPACITY OF WOOD PIPES.

The United States Department Agriculture carried out extensive experiments on the flow of water in Wood Stave Pipe.

Report: " The data now so far does not show that the capacity of Wood Stave Pipe either increases or decreases with age. That wood pipe will convey about 15 per cent. more water than a ten year old cast iron pipe or a new riveted pipe ; and about 25 per cent. more than a cast iron pipe 20 years old, or a riveted pipe 10 years old."

From Government Experiments, carrying capacity of Wood Stave Pipe is from 15 per cent. to 25 per cent. greater than metal pipe. The carrying capacity of cast iron and steel pipes greatly decreases with age.

For special prices, *see advt., p. 8.*

ARTESIAN WELL BORING.

By C. E. Mayes Ajtesian Bore Contractor.

BORING FOR WATER.

The great success attending the results of artesian well-boring (both Government and private contracts) during the last 30 years throughout Australia, and the improved methods for boring, has reduced the problem of boring in numerous districts from a speculation to a comparative certainty.

The large expanse of the **Tertiary and Cretaceous strata** or geological strata country of recent formation, is the water bearing strata.

Owing to the limited and uncertain rainfall, at least one-half of Australia must ultimately depend upon its water supply from artesian wells. The maps of Australia show that the N.W. portion of New South Wales, as well as the interior between the Lachlan and Darling Rivers, are destitute of rivers : this is also the case with the South West, West and interior of South Australia, and the interior of Western Australia, extending to the Great Australian Bight on the South Coast. The rainfalls of these vast flat areas do not find their way to the sea, but end in lakes, swamps, and underground streams, leading to immense basins with impervious beds, which only have to be tapped to bring the water to the surface. These beds are from 1000 to 4000 feet below the level of the sea. The back plain country being only 200 to 400 feet above sea level.

When the water does not rise quite to the surface, it is called **sub-artesian,** and requires the installing of deep well pumps. In many cases, salt water has to be passed through before fresh water is obtainable. This is shut off by enclosing the bore hole with steel tubes, or casing.

The more simple methods of obtaining water, at shallow depth, are the following :—

TUBE WELLS.

Norton's Abyssinian Tube Wells.—The apparatus includes 28 feet of 1¼in. gal. iron pipes, with perforations, and a steel shoe at the bottom, and costs in Sydney only £16, for 2in. pipes, £18 complete ; stronger and larger plants, £50 to £70. The pipe is supported by a wrought iron tripod stand, and driven by an iron monkey. In Christchurch, N.Z., tube wells are common.

Australian Water Auger is an earth auger, and is used in the same way as a carpenter's auger, with screwed iron rods for turning. The apparatus is simple and easily worked, and costs about £250 with tools, casing and appliances to sink 200 feet if possible. Sinking under favourable circumstances will progress at the rate of 2ft. per hour for a 5in. auger.

Prospecting Boring in Small River Gravel, Shoalhaven Alluvial Flats.

Hand power auger, with portable shear legs, windlass, 3½in. shell and screw-augers, 1in. x 1in. square rods.

50 trial bores, 30 to 85ft. of river wash, shifting 80 yards to each bore. Labor only, cost 1/- per foot. Plant cost £65.

Prospecting Boring in felsite, Burragorang, to 560 feet, with a small steam cable-boring plant, for a 6in. diameter bore. Cost, including a second hand plant bought for £200, £1120, or £2 per foot deep.

The last two systems were used and cost ascertained by the author in 1914, *so reckon about double for* 1927.

BORING AND PLANT REQUIREMENT.

Water Conservation and Irrigation, 1927.

By D. W. Price, Chief Inspector and Superintendent of Bores, N.S.W.

The two methods of drilling most commonly employed are known as the **Standard or Cable Tool Method,** and the **Hydraulic, or Rotary Method.** Each of these systems is successful when used for drilling in ground to which it is adapted. In general, the cable tool method is preferred where the series of strata to be pierced is hard, and the severe impact of the walking beam motion is needed to churn the hole.

In soft and loose material, the **Rotary Method** is usually superior, and while it entails a greater expense for labor, fuel and maintenance of machinery, yet the speed it often attains and other advantages often warrant the added expense.

The Rotary Method has been in use but very little in Australia, principally through its cost and transport being prohibitive. But indications are at hand, when it is expected in the near future that such conditions suitable to our formations will be brought forward which will recommend the Rotary System more for general use.

The Standard or Cable Plant, with the necessary tools are made in this and other States. But Rotary Plant are so little understood that it is necessary to import them. The principal manufacturers for Rotary or any other plant are *The Lucy Manufacturing Corporation* and *Oil Well Supply Co. Ltd.*, America.

The approx. cost of a **Rotary Plant,** F.O.B. Sydney, £7,000. **Standard Plant,** F.O.B. Sydney, £3,000.

Good reliable **Shallow Boring Plants,** 500ft. capacity, £600.

These are Australian made, and I think preferable to those imported.

Casing used for boring at the present time is principally Stewart & Lloyd's Russian Brand, and Government specifications are.

Lighter Casing, seldom used, 4in. dia. x $\frac{3}{16}$in., 3/6; 4in. x $\frac{7}{32}$in. thick, 3/9; 5in. x $\frac{3}{16}$in. thick, 4/– per ft. As the price fluctuates and our department indents our supplies, I am not sure of present prices. However, Stewart & Lloyd's would give you this.

The prices ruling depend greatly on the position of site, and of course, the competition. But a good average price would be 1500ft., £2 per ft.; 2500ft., £2 10s. per ft.; 3500ft., £3 per ft.

Under some conditions which are considered favourable, and competition more keen, prices are cut even on these prices.

Sub-artesian Boring is making great strides. No doubt nature has given this supply to a large extent to take the place of the **artesian bores,** which will without doubt give out in time, the yearly records prove this beyond doubt.

The most suitable shallow plant would be a 500ft. capacity. We have put holes down 1400ft. and providing no casing trouble occurs and care is observed, this particular plant will do this depth. However, for districts where wood and water is scarce, I would recommend an oil engine instead of steam, the weight of plant with steam power, tools, etc., about 12 tons. With oil driven plant, 7 tons.

The casing used for shallow boring is principally 6in. x $\frac{3}{16}$in., being considered quite heavy enough. It also comes cheaper. Very often, 5in. casing is used. This is not considered advisable. Should any accident occur to mudwell pump, etc., the inside margin of casing is too small for necessary repairs.

The only manufacturers reliable, who understand boring tools are *John Overall & Sons, Balmain* and *Cockatoo Dock.* These do all our work, and I think the remainder of private, as this commission has 34 shallow plants, also two deep rotary and combination plants. The supplying of tools to us is a big item.

Sinkers.—In sinking, additional weight is given to the chisel bits by a sinker which is a cylinder of wrought iron screwed on to the bit. The sinkers are from $2\frac{3}{4}$ to 5ins. diam., and from 12 to 28 feet in length, in one or two parts.

Jars.—To prevent the jarring of tools, or when jammed to loosen them, a jar is used next to and above the sinker. It is about 5ft. long, with a sliding joint between ends, and both ends have connecting conical screws, and is an indispensable jar for all " percussions " drilling rigs.

As the boring or drilling proceeds, the casing is lowered to prevent the sides caving in or falling away.

ARTESIAN WELLS.

The sinking of these wells or bore holes for great depths, by heavy machinery and steam power is generally commenced by boring with an auger an 11in. hole as deep as possible.

Into this bore is inserted 10in. wrought iron tube or casing, in lengths of from 4 to 18ft., with screwed ends. Inside this tube, holes are *jumped* by percussion for casings of 8, 6, and 5in. diam., as required. Each size of casing used is started from the surface, and continued as far as *possible.*

If the ground is very porous the whole of the casing is sometimes left in the bore at completion.

In drilling, the rock, shale, &c., is reduced with water to the consistency of cream by heavy pulverising and cutting tools suspended on cable, after the manner pursued by quarrymen. The silt afterwards is removed by mud or sand pumps, whose outer diam. are at least $\frac{1}{2}$in. less than the bore of the casing, their lengths varying from 5 to 30ft., the lower ends of the sand-pumps have chisel shaped shoes of $\frac{5}{8}$ steel, screwed on to the tube or casing, with a valve to *open upwards* the whole forming the **sand pump,** which by the aid of a $\frac{1}{2}$in. wire rope is lowered and raised in bore.

The Poppet Head or Derrick, is a pyramidal frame made of Oregon pine, or wrought iron; the general size is 16ft. square at base by a height of 56ft. with the top 4ft. square; it is in 7 stories of 8ft. each, resting upon hardwood sole plates or sleepers about 10in. x 8in., and erected over the proposed bore hole to support the gin wheels over which the wire ropes pass, connecting the spools or drums with the tools, &c.

Timber Required for Derrick.

	Sup. Ft.
4 Standards, 56ft. x 9in. x 2in., and 56ft. x 7in. x 2in., the two forming an anglewood 9in. x 9in. in seven lengths to each standard, butt jointed and fished with Oregon fish plates...	600
28 Bearers, average 9ft. x 8in. x 2in.	336
28 Diagonals, average 13ft. x 6in. x 2in., only four diagonals to each bay, alternately reversed	364
24 Joists, 6 x 2, laid flat for flooring, fish plates, &c.	308
4 Sleepers for flooring, 18ft. x 10in. x 8in., and top bearers of hardwood	592
	2200

Large beams, 18in. to 24in. diam., are used under floor each side of bore when hydraulic jacks are used to remove casing jambed, &c.

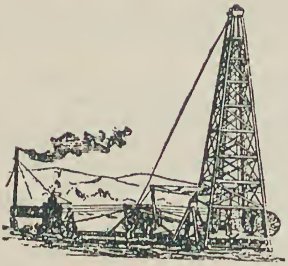
The Canadian or Pole System.—Wooden rods, about 2¼ins. diam., pine, spotted gum or yellow wood, are connected by iron pole joints with cylindrical screws of Lowmoor iron, and centre straps riveted to the wooden rods (about 18ft. long) slightly tapered at the ends to receive them. The boring string of tools, viz., bit, sinker and jar, weighing about 10 to 15 cwt., are attached to the rods, and lowered or raised, length by length, 38ft. at a time (*a very tedious method in deep bores*), now superseded. Some of the deepest bores have been sunk with this system; notably, four in the Moree district, N.S.W.—3765 deep feet at Tulloona, and 4086 feet deep at Dolgelly, were sunk by the author, C. E. Mayes, who is seen standing at corner of derrick, D. W. Price, engineer, sitting on beam, left, and writer of following latest article on Boring and Plant requirements.

Weight of Plant, viz., engine, boiler, rig, derrick, camp equipment, tools, &c., about 15 to 36 tons.

Cartage to and from railway station, and transit by railway to be added.

SYSTEMS OF BORING.

The Cable System.—Steel wire rope for its quickness in extracting and re-lowering tools recommends itself. A driller and an engine-driver, or "wrenchman," are required for each shift.



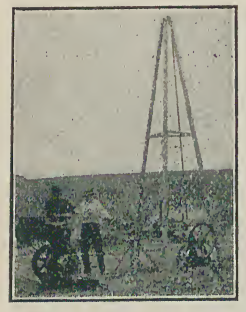
The large main spool for wire rope, called a "bull" wheel, and a smaller sand spool for sand line, worked by a *friction belt* or sand-spool, and a *rope belt* on pull wheels, are brought under the control of driller by levers and brakes.

The *walking beam* is the lever beam 10 to 25 feet long, used to give the up and down percussion movement to the cutting tools and can afterwards be used for pumping.

Risks, Accidents and Delays.—With the exception of mining, "Artesian Boring" is probably the most risky in the isolated districts of Australia.

The risk from broken tools, or the telescoping of casing, or other unforeseen accidents is great, and must beallowed for in tendering.

Cable Drilling or Boring Plant, for shallow boring or sub-artesian, to 500 feet. Frame built of angle iron, except the derrick. Equipped for depths 250, 500, and 1000ft. respectively. Weight 500ft. "Plant Rig," about 3 tons, 1000ft. "Plant Rig," about 3½ tons. Mounted on 3 or 4ft. iron wheels, for transport over rough bush roads.



Both **Winding drums** for raising **tools** and **sand pump** are **friction geared,** no cog gearing being used. The derrick is detachable.

A 4 h.p. Nominal or Steam Gas Engine is required. Price, see following page.

For further information, see manufacturers, Overall, McCray, Ltd., Artesian Well Specialists and Contractors, Sydney.

Cost of Machines and Boring in Alluvial Soils.

No. 1.	Plant with two 8in. earth augers, horse gear, &c., complete for a depth of 115ft. ...	£140	per ft. 12/–
No. 2.	Ditto for a depth of 210 feet	160	14/–
No. 3.	do. 306 ,, ...	180	16/–
No. 4.	do. 400 ,, ...	200	20/–

Award Wages, 1923, Driller, from £6/10/– upwards; Laborer, £4/2/–. per week; with board, £2/17/–; Waggonette driver, award wage, 2/0¼ per hour.

" **Drysdale** " **Borehole Centrifugal Pumps,** for deep sub-artesian wells
Agents : Wildridge, Sinclair Ltd., 97 Pitt St., Sydney.

BRASS ARTESIAN CYLINDER PUMPS.

With Gunmetal Caps.

From 1¾in. dia. to ¾in. dia., to insert in bore casing for lift pumps.
See advt., p. 10.

When Water is reached by boring, it sometimes fails to rise to the surface. In such cases it is pumped up by deep well pumps, with brass tubes 4ft. 6in. long by 3½in. diam., having two brass valves for bottom and top, such a pump would cost about £25. As the pump rods are not liable to torsion, but only subjected to tension, ½in. galv. iron tubes are sufficient, having been used in one instance in Queensland for a depth of 1760 feet. When the water rises above the surface, it may be shut off by a valve, and supply regulated.

Leading drains are formed to direct the output of water when " struck " in boring. This is sometimes done by simply dragging the fork of a tree, the junction end first shaped pointed, or with a plow-share in front, the earth being forced out on both sides by the heavy trailing limbs following the flow of the water. This simple method often saves taking levels, and is much easier done while the earth is soft.

Drag Scrapers, 3½cub. ft., £4 5s. ; 5 cub. ft., £4 7s. 6d. ; 7 cub ft., £4 10s.

Water for Engine, etc.—About 900 cubic inches of water is required per horse-power per hour — 3¼ gallons per hour x 24 — 78 gallons per day, and 78 x 10 — 780 gallons per day of 24 hours continuous drilling for a 10 horse-power engine.

For camping purposes, 100 gallons for waste and the use of the men in the camp, making in all 1100 gallons, or nearly five tons of water per day. As the engine is not always at work and seldom works up to its limit, the average would be about 800 gallons per day for a 10 h.p.

For larger boiler and engines, with camp allowance, up to 1500 gallons per day.

Reservoir.—When a drought is anticipated, a reservoir can be made at least 40ft. square at bottom, and 80ft. square at top by a depth of 10ft. at water level, this will hold 37,600 cubic feet of water, and will cost from £100 to £150 with the necessary waste weir. Portion of N.S.W., W. of the Paroo and Darling Rivers, and Queensland, is especially liable to drought, the annual fall of rain is only 10in. per annum ; so that condensers must be provided in any boring outfit to economise the water used as much as possible. The water hole should be alongside the water course, so that the bulk and rush of flood waters would not destroy it.

Fuel required. About 10lbs. of good pit coal per horse-power per hour is required for a portable steam engine ; the relative steam producing power of good hardwood as compared with good coal is about one-half, therefore 20lbs. of good hardwood per horse-power per hour would be required, and for a 10 horse-power engine 200lbs. per horse or 4800lbs. for a day of 24 hours.

Heavy work will take about 10 cords of hardwood per week.

TUBES FOR ARTESIAN BORES.

WEIGHT in lbs. per foot of WROUGHT IRON CASING with swelled or flush joints.

External Diameter	Thickness in fractions of an inch.									
	5/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2
4in.	6.3	7.5	8.7	9.9	—	—	—	—	—	—
4½in.	7.2	8.6	9.8	11.2	12.5	13.8	—	—	—	—
5in.	—	9.6	11.1	12.6	14.1	15.5	16.9	18.4	—	—
5½in.	—	10.5	12.2	13.9	15.5	17.1	18.7	20.2	—	—
6in.	—	11.5	13.4	15.2	17.0	18.8	20.6	22.3	—	—
6½in.	—	12.5	14.5	16.5	18.5	20.4	22.3	24.3	—	—
7in.	—	13.5	15.6	17.8	20.0	22.1	24.2	26.2	30.3	—
7½in.	—	—	—	19.2	21.5	23.7	26.0	28.2	32.6	—
8in.	—	—	—	20.5	22.9	25.4	27.8	30.2	35.0	—
8½in.	—	—	—	21.8	24.4	27.0	29.6	32.2	37.5	—
9in.	—	—	—	23.1	25.9	28.7	31.4	34.2	39.6	44.9
10in.	—	—	—	25.8	28.9	32.0	35.1	38.1	44.2	50.2
11in.	—	—	—	28.4	31.8	35.3	38.7	42.1	48.8	55.5
12in.	—	—	—	31.1	34.8	38.6	42.3	45.0	53.4	60.7

Length	Sheep			Cattle			Length	Sheep			Cattle		
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
12ft.	3	2	0	4	5	0	66ft.	13	18	0	18	17	6
18ft.	4	6	0	5	17	6	75ft.	15	2	0	20	10	0
30ft.	6	14	0	9	2	6	84ft.	17	10	0	23	15	0
36ft.	7	18	0	10	15	0	90ft.	18	14	0	25	7	6
48ft.	10	6	0	14	0	0	102ft.	21	2	0	28	12	6
54ft.	11	10	0	15	12	6	108ft.	22	6	0	30	5	0

CASING.

Stewart & Lloyd's Swelled Joint.

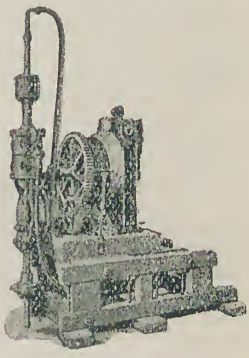
Outside Diameter.	Thickness of shell.	Weight per foot.	Compression Test	Price per foot.
in.	in.	lb.	tons	
5	7/32	11.12	48	4/6
6⅜	¼	16.22	65	6/–
8	9/32	23	80	8/6
10	11/32	35.2	100	15/10

DIAMOND AND MACHINE DRILLING.

DIAMOND CORE DRILLING.

Notes by James E. Elliott, of The Goldfields Diamond Drilling Co. Ltd., 1926

Engineers and contractors have found the Diamond Drill of great value for preliminary testing for foundations for building bridges, barrages, or weirs. quarries, and for all kindred purposes where it is necessary to locate solid rock or to determine the depth at which the rock is sufficiently homogeneous to carry foundations or to enable tunnelling to be safely accomplished.



Test drilling for the Metropolitan Water Supply Department, Sydney, in connection with their main tunnel project, North Sydney sewerage to ocean.

For the Queensland Government, test holes from the bed of and across the Dawson River for barrage purposes for irrigation dam, the drill being set up on a combination of floats and raft, with a special device to take care of the rise and fall of river level.

For the Rockhampton City Council, Queensland, we drilled test holes from the bed of and across the Fitzroy River, from platforms erected on driven piles, the steam boiler being on a barge adjacent.

For the Melbourne City Council, test bores at one of their stone quarries. Test drilling in limestone formation for a cement company in N.S. Wales. Test bores for mining in general from coal mines to gold mines, also testing for oil bearing strata, Coorong in South Australia, Latrobe in Tasmania.

Bore holes have been used to assist in the drainage and ventilation of mines, and for rope-ways for haulage purposes.

The drill is capable of boring to 1 mile in depth vertical, 1200 feet in length horizontal, and 1500ft. dipped at an angle of 45 deg. Holes may be drilled vertical up or down, and at any intermediate angle, from any point in the mine workings underground, or from surface and in any direction.

The standard diameter of core in coal borings is 2 inches, while in lode boring it is 1⅛ inch and at times 15/16 inch.

The "Clinostat" is an instrument used to show deviation of bore.

By the use of the "Dip Indicator," the direction of dip of strata, reef or lode may be ascertained.

A drill for 1000ft. weighs 18 cwt., and occupies a floor space of 3ft. 6in. x 6ft. 6in.

For underground boring no derrick is required, a recess in line of borehole, 14ft., is required to work the boring tools.

For surface boring to a depth of 2000ft., a tripod derrick is used. 32 feet high. For a greater depth a higher derrick is used, for the 20ft, rods.

The motive power may be steam combustion engines or electricity, and for underground boring, compressed air or electricity.

The amount of power for boring to 1000ft. is from 150 to 240 cubic feet of **free air** per minute, according to depth, or from 20 to 36 amperes at 220 volts if **electric power is used.**

Brazilian Carbon Diamonds, amorphous in structure and extremely hard, are used for boring hard rock.

The price of carbon during 1906 fluctuated between £15 and £25 per carat. A carat equals 3.17 troy grains.

The Australian Bort is unsuitable for boring hard rock, because of its crystalline and granular structure, which renders it susceptible to fracture. The South African Bort is too brittle to be of any use for boring, and Brazilian Ballas, being round and smooth, is deficient in the necessary cutting edges.

Holes vertically up, or at an angle above horizontal are restricted in length because the water head in the boring rods equals the pressure capacity of the flushing pump.

The cost of drilling these holes is about 2/6 per foot more.

In rocks of extreme hardness, such as granite, diorite, felsite, and quartzite, from 60 to 100ft. per week may be drilled, and in rocks of medium hardness, such as slates, schists, indurate sandstones and diabase, from 100 to 150ft. per week.

The progress decreases as depth is attained. Slow progress is often made in fast cutting rocks by reason of the frequent necessity to draw the cores which plug in the core barrel.

Rocks are more favourable to boring when intersected at right angles to the cleavage plans.

The amount of water required to flush the diamond bit depends upon the nature of the rock being drilled. If the water goes a maximum of 4000 gallons per day of 24 hours may be required ; or 300 gals. if tight strata.

The **cost of boring** ranges between 15/– and 35/– per lineal foot, according to the nature of the rocks to be intersected. Boring for quartz reefs or lodes is necessarily more expensive than boring in coal measures or basalt rocks by reason of slower progress and greater carbon expenditure.

COST OF PLANT.

Landed City Wharves—All States.

Diamond Prospecting Drill, capacity 300ft. — £250.

Diamond Drill, hydraulic feed, for steam or compressed air power vertical capacity 1000 feet, or horizontal, 800ft.—£800 to £1000. according to equipment.

DIAMOND DRILL BORING.

Extract from N.S. Wales Mining Report.

Cost of Boring.

Sandstone and coal measures, 5/– to 10/–.

Bore at Broken Hill for minerals through quartzite, granite, diorite, gniess, and mica slate, very hard strata, and destructive on diamonds. Total depth bored, 1122ft., days occupied, 133 ; rate per hour, 5.96 ins. ; cost per foot, 20/–. These costs are exclusive of officers' salaries, rent, &c.

Cost of diamonds used per foot in depth, average from 1/6 to 2/2.

LEGAL NOTES.

RELATING TO BUILDERS AND CONTRACTORS AND ARCHITECTS.

TENDERS.

Tenders for Work or Goods.

A person who, by writing or by word of mouth, invites tenders for work to be done, or offers of or for goods for purchase or sale, does not by such invitation impliedly promise to accept any tender or offer, the invitation or notice to the effect that "tenders will be received," being no more than an announcement (unless it is expressly stated otherwise) that he is willing to receive tenders or offers (*Spencer* v. *Harding*, 5 L.R.C.P. 561).

But an unconditional tender to undertake work, or to supply goods, on specified terms, and the acceptance of such by the person to whom it is made, will be sufficient to constitute a binding contract; and an intimation in the acceptance of such tender, that a "contract will be prepared," merely means that a formal contract is to be drawn up (*Lewis* v. *Brass*, 3 L.R.Q.B.D. 667). If, however, the terms of the tender or acceptance imply that the proposed agreement is to be *subject* to the preparation and approval of a formal contract, there will be no binding agreement until the formal contract is completed (*Winn* v. *Bull*, 7 L.R. Ch. D. 29).

When Contracts should be in Writing.

A contract to build, alter, or repair a house, or any other construction, and to provide materials for the purpose, need not be in writing, unless it is *not to be performed within a year*; a contract to build, alter, or repair a house, etc., not being in law a contract for the sale of goods, even as regards the materials, but being an entire contract for work and materials.

But as regards building or other contracts which are not to be performed within a year—that is, contracts the complete performance of which will necessarily extend over more than a year, or the performance of which is intended by the parties to extend over more than a year—by the Statute of Frauds (29 Ch. II. c. 3, s. 4) "no action shall be brought . . . upon any agreement that is not to be performed within the space of one year from the making thereof, unless the agreement upon which such action shall be brought, or some memorandum or note thereof, shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorised."

It is not necessary in every case that there should be a formal contract drawn up with technical precision or legal formalities. Any memorandum under the hand of the "party to be charged," which was made before action brought, and which names the contracting parties, or so describes them as to identify them, and which contains, either expressly or by references to other written papers the terms of the agreement, will be sufficient to satisfy the Statute of Frauds, although it be merely a recognition or adoption of a prior written statement

of such terms not signed by the party. But a memorandum expressing a *mere purpose* or *intention* is not sufficient to satisfy the Statute. Again, where a contract or note in writing exists which binds one party any *subsequent* note in writing, signed by the other, will be sufficient to bind him, provided it either contains in itself the terms of the contract, or refers to any writing which does contain them.

Building contracts entered into with a corporate body, to be binding upon the corporation, should be made under seal (*Hunt* v. *Wimbledon Local Board*, 4 L.R.C.P.D. 48; *Young* v. *Mayor of Leamington*, 8 L.R.Q.B.D. 579). But trading corporations can contract without seal for matters essential to the purpose for which they are formed (*South of Ireland Colliery Company* v. *Waddle*, 38 L.J.C.P. C38).

Contracts for Sale of Goods.

By the Sale of Goods Act, 1923, a contract for the sale of any goods *of the value of* £10 *or upwards* shall not be enforceable by action unless (i.) the buyer shall accept part of the goods so sold, and actually receive the same; or (ii.) give something in earnest to bind the contract, or in part payment; or (iii.) unless some note or memorandum in writing of the contract be made and signed by the party to be charged or his agent in that behalf; and these provisions are to apply to every such contract, notwithstanding that the goods may be intended to be delivered at some future time, or may not at the time of such contract be ready for delivery.

There is an "acceptance" of goods within the meaning of the Act when the buyer does any act in relation to the goods which recognises a pre-existing contract of sale.

Contracts with Building Committees.

Where a building contract is entered into with the trustees of a building fund, as of a church, chapel, or school, the contract may be so framed as to limit the liability of the trustees to the period during which they remain trustees, as well as to exempt such trustees from all personal liability, binding them only to the extent of the building fund (*Williams* v. *Hathaway*, 6 L.R.C.D. 544).

Death of Employer before Building Contract completed.

It is a presumption of law that the parties to a contract bind not only themselves, but their personal representatives, except in the case of contracts involving the exercise of individual skill personal, such as a contract to paint a picture. And so, in the case of a building contract, where the employer dies before the contract is completed, his executors or administrators are bound not only to pay such sums as may be due for work already done under contract, but to carry out the deceased employer's obligations so far as they remain unfulfilled under the contract; and, on the other hand, the executors or administrators of such deceased employer will be in a position to bring an action against the builder if he fail to carry out his part of the contract (*Wentworth* v. *Cook*, 10 Adolphus & Ellis 42; *Cooper* v. *Jarman*, 3 L.R. Eq. 98).

Contracts of Hiring.

It is sometimes advisable that contracts of hiring and service should be in writing, in view of the provision made by s. 4 of the Statute of Frauds as to "agreements not to be performed within the space of one year from the making thereof."

It should also be remembered that where no time is limited, either expressly *or by implication*, for the duration of a contract of hiring and service, the hiring is considered, in law, a hiring for a year. And this rule applies to all contracts of hiring and service, whether written or verbal, whether express or implied, and whatever the nature of the service (*R.* v. *Worfield*, 5 T.R. 506; *Emmens* v. *Elderton*, 13 C.B. 495). But it does not apply where the contract contains stipulations inconsistent with the application of it (*Baxter* v. *Nurse*, 6 M. & G. 935). Nor does the rule apply where there has been a service, but no contract of hiring, and no circumstances from which a contract can be implied (*Beeston* v. *Collyer*, 4 Bing. 313).

If the agreement is to do work by the job, it cannot be considered a yearly hiring, although the job last more than a year (*R.* v. *Woodhurst*, B. & Ad. 325). But if the hiring be for a year, a mere stipulation for payment by piece-work will not render it the less a yearly hiring (*King's Norton* v. *Cambden*, 2 Str. 1139). In a case where the hiring was at 3s. per week "all the year round," with liberty to leave on a fortnight's notice, this was held to be a yearly hiring (*R.* v. *Birdbrooker*, 4 T.R. 245).

Where the *only circumstance* from which the intended duration of a contract of hiring and service can be inferred is the *reservation of wages weekly* it must be taken to be a weekly hiring. But if there be anything in the contract of hiring to show that it was intended to be for a year, the reservation of weekly wages will not control it.

All contracts of hiring and service are put an end to by the death of the master, and therefore the executors or administrators of the master cannot bring an action to enforce a contract of service after his death.

An indenture of apprenticeship is dissolved by the death of either master or apprentice (*R.* v. *Peck*, 1 Salk. 68). But where the apprentice is bound to two masters, on the death of one he becomes the apprentice of the survivor (*R.* v. *St. Martin*, 1 Harr. & W. 69).

Building and Leasing Agreements.

Where an owner of land agrees with a builder that, upon the erection of houses upon such lands in conformity with the terms and conditions of the agreement, the owner will grant to the builder leases of separate plots of such land, such an agreement is a separable contract; and the builder (or assignee of such agreement) will be entitled to have leases of particular plots granted to him upon his performance of the agreement so far as those plots are concerned, although he may be unable to carry out the agreement in its entirety (*Williamson* v. *Clements* 8 L.R. Ch. 96).

It has been held by the Court of Appeal that a building containing several residential flats constitutes only one house within the meaning of the word "house" in a covenant not to erect more than a certain

number of houses, unless there is some context which cuts down or alters the popular interpretation of the word (*Kimber* v. *Admans*, C.A. [1900] 1 Ch. 412).

Architect's Certificates.

Where an architect's certificate that work has been done in a satisfactory manner is a condition precedent to payment under a building contract, a letter from the architect inclosing the builder's account, or a mere checking of the account by the architect, is not sufficient; but the architect's certificate must be in terms showing that the work has actually been done (*Morgan* v. *Binnie*, 9 Bingham 672).

But when an architect has fraudulently and in collusion with the employer, withheld a certificate that the builder has satisfactorily executed the work he had undertaken, the builder, if the contract was made with him by the architect as the agent for the employer. can sue the architect for damages (*Ladbrook* v. *Barrett*, 46 L.J.C.P.D, 798; and see *Milner* v. *Nield*, 5 Ex. 829). And where the contract is made direct with the employer, and not through the architect, the builder under similar circumstances may proceed against the architect (*Stevenson* v. *Watson*, 48 L.J.C.P. 318).

Where an architect has acted "improperly and unfairly in the exercise of the powers conferred on him by the contract," so that the builder is a loser through his misconduct, the builder will be entitled to recover from the employer the full amount to which he is entitled under the contract (*Pawley* v. *Turnbull*, 3 Gifford 70).

But an action will not lie against an architect for carelessly and negligently performing the work required to give a certificate, unless fraud be also established, the duties of the architect in relation to granting a certificate being not ministerial but judicial (*Stevenson* v. *Watson*, 48 L.J.C.P. 318).

Where a building contract provided that the decision of the architect as to the execution of works should be final and without appeal, and the building-owner refused to pay a portion of the architect's fees, on the ground of alleged negligence by the architect in not deducting from the builder's account a sufficient amount for work not actually done, it was held by the Court of Appeal that, although the architect's certificate was final as between the builder-owner and the builder, the building-owner was not bound by it as between himself and the architect (*In re Rogers*, architect; see *Architect*, Nov. 20, 1891).

Charges of Quantity Surveyor.

It was decided in 1892 that the "reasonable usage" of the building trade is that the builder whose tender is accepted is liable to the quantity surveyor for the amount due for taking quantities; but if no tender be accepted, the building owner or architect is liable (*North* v. *Bassett*, 1 Q.B. 333).

Extras.

Where a claim is made for extras, it must be shown from the original contract what was intended to be included therein, so that what will constitute extras may be ascertained (*Buxton* v. *Cornish*, 12 M. & W., 426).

In a case where a builder had contributed to build and complete a house according to a specification, and the specification, while mentioning the scantling of joists for the floors, rafters, and ridge and wall plates, made no mention of the flooring, it was held that the builder could not charge the flooring as an extra; the agreement and specification, taken together, making it clear that the builder could not have reasonably supposed the flooring would be an extra (*Williams* v. *Fitzmaurice*, 3 H. & N. 844).

Where it is stipulated in a building contract, that additions made under "an order in writing" shall be paid for, the builder cannot claim payment for extras which may be done without such order, even though done at the verbal request of the employer (*Russell* v. *Bandeira*, 13 C.B.N.S. 149; *Westwood* v. *Secretary of State for India*, 7 L.T.N.S. 736; *Franklin* v. *Parke*, 6 L.T.N.S. 291). And even though payments in advance have been made on the architect's certificates after variations have been made, these will not obviate the necessity of showing that "orders in writing" directing the variations were given as required by the contract, to enable the builder to make a valid claim for payment for such variations (*Tharsis Sulphur and Copper Company* v. *McElroy*, 3 L.R. App. Cas. 1040).

Mere sketches of extra work, drawn by the architect, and by him handed to the builder, are not in themselves a sufficient compliance with a requirement that extras are to be done under an order "in writing" (*Myers* v. *Sarl*, 30 L.J.Q.B. 9).

But where it was stipulated in a building contract that no extras should be allowed without a written order, and that in case of dispute the architect's decision was to be final, and the architect at the end of the contract made a certificate allowing extra work for which no written order had been given; it was held that neither employer nor builder could raise the question whether a sufficient order had been given, unless the conduct of the architect in making the certificate had been fraudulent (*Goodyear* v. *Mayor of Weymouth*, 35 L.J.C.P. 12).

FIXTURES.

"Tenant's fixtures" are personal chattels annexed to the freehold by the tenant during his occupancy, either for mere ornament and convenience or for the purpose of his trade, and which he has a right to sever during such occupancy in the absence of any express stipulation or local custom to the contrary.

"Landlord's fixtures" are those put up by the landlord before or during the term of the tenant's occupancy, or by any previous owner or tenant or by any other person; also such fixtures put up by the tenant during the term as the tenant has no right to remove. All these constitute part of the freehold, and also part of the premises demised. In a more confined sense, "landlord's fixtures" are the fixtures which are on the premises at the time of letting to the tenant and are demised therewith, and which are usually specified in a schedule to the lease or agreement; and to these may be added erections and fixtures subsequently added by the tenant, which he is not entitled to remove during his occupancy.

Amongst articles put up for ornament or for convenience of a tenant which have been held to be removable as *tenant's fixtures*, are : hangings, tapestry, and pier-glasses, whether nailed to the walls or panels or put up in lieu of panels ; cornices ; marble and other ornamental chimney-pieces; marble slabs ; window-blinds ; wainscot when *screwed* to the walls ; grates, stoves, and ranges, although fixed in brickwork ; iron backs to chimneys ; beds fastened to the walls or ceilings ; fixed tables ; furnaces and coppers ; pumps ; wash-tubs ; fixed water-tubs ; coffee and malt mills ; cupboards fixed with hold-fasts ; bookcases standing on brackets and screwed to the walls, clock-cases ; iron ovens. But such fixtures can only be removed if the removal can be effected without material damage to the freehold.

A wider rule prevails at law with respect to trade fixtures than to fixtures for mere ornament or convenience of an occupier. Thus, a nurseryman is allowed to remove his greenhouses, but a private individual is not (*Wyndham* v. *Way*, 4 Taunton, 316). But greenhouses built in a garden, and constructed of wooden frames fixed with mortar to foundation walls of brickwork, cannot be removed by the occupier who built them ; nor may a boiler built into the masonry of the greenhouse be removed by the tenant ; but the pipes of a heating apparatus which is connected with the boiler by screws may be removed by him (*Jenkins* v. *Gething*, 2 Hemming and Johnson 520).

Among appliances which have been held to be *trade fixtures removable by a tenant* (in the absence of express stipulations to the contrary in the lease) are : furnaces, vats, coppers ; dyeing and brewing vessels, and pipes belonging thereto ; steam-engines, and chimneys belonging thereto ; baking-ovens ; cider-mills ; salt-pans. Machinery, engines, plant, and utensils used in trade, however bulky or complex, may be taken to pieces and removed ; also a temporary shed erected for the purpose of protecting a steam-engine or machinery, or for other temporary purpose ; but if the building stand on stone or brick foundations let into the soil, and is so constructed as not to be removable without the entire destruction of the fabric, it cannot be disannexed from the freehold and taken away.

A tenant should always remove his fixtures prior to the determination of his tenancy, for after he has quitted the premised he cannot re-enter for the purpose of severing and removing his fixtures without express permission (*Lyde* v. *Russell*, 1 B. & A. 394 ; *Minshall* v. *Lloyd*, 2 M. & W. 450).

And in whatever mode a lease or other tenancy be determined, the tenant has no right (unless protected by special contract) to remove his fixtures after he has ceased to be in lawful possession. Thus, where a tenant had forfeited his lease by an act of bankruptcy, and the landlord re-entered, it was held that the landlord was absolutely entitled to all fixtures remaining upon the premises at the date of the re-entry (*Pugh* v. *Arton*, 38 L.J. Ch. 619).

WORKERS' COMPENSATION ACT, 1926.

The right of a worker to recover compensation from his employer for injuries or disease contracted in the course of his employment is

now governed in New South Wales by the Workers' Compensation Act, 1926.

Section 7 (1 and 2) of the Act states :—

"(1) A worker who receives personal injury—

(a) in the course of his employment, whether at or away from his place of employment ; or

(b) without his own default or wilful act, on the daily or other periodic journey between his place of abode and his place of employment,

(and in the case of the death of the worker, his dependants) shall receive compensation from his employer in accordance with this Act.

Compensation shall not be payable in respect of an injury received during any substantial interruption of, or deviation from the journey referred to in paragraph (b) of this sub-section, if the interruption or deviation is for a reason unconnected with the worker's employment.

(2) Compensation shall be payable in respect of any injury resulting in the death or serious and permanent disablement of a worker, notwithstanding that the worker was, at the time when the injury was received, in a place not directly concerned with his employment, but forming part of the employer's premises, or acting in contravention of any statutory or other regulation applicable to his employment, or of any orders given by or on behalf of his employer, or that he was acting without instructions from his employer, if such act was done by the worker for the purposes of and in connection with his employer's trade of business."

and the succeeding sections set out the methods of computation on which compensation by way of weekly payments is to be made. It should be noted however that the Act provides that at the option of the worker the employer may be ordered to pay a lump sum ranging from £75 to £675 according to the injury received.

The pivot on which the Act works is in Part III. which provides for compulsory insurance by each employer with an insurer specially licensed under the Act, unless the employer has obtained permission from the Workers' Compensation Commission to undertake his own liability.

The administration of the Act is placed in the hands of a Workers' Compensation Commission consisting of a chairman and two other members, whose decision shall be final except where it chooses to state a case on a question of law to the Supreme Court for decision.

The following subsections of section 6 of the Act should be particularly noted with reference to the positions of a contractor under the Act :—

"1. (*inter alia*). In this Act, unless the context or subject matter otherwise indicates or requires :

'*Employer*' includes any body of persons, corporate or unincorporate, and the legal personal representative of a deceased employer. Where the services of a worker are temporarily lent or let on hire to another person by the person with whom the worker has entered into a contract of service

or apprenticeship the latter shall, for the purposes of this Act, be deemed to continue to be the employer of the worker whilst he is working for that other person. Employer also includes any Government department heretofore or hereafter created, or any Minister, trust, commission, or board exercising executive or administrative functions on behalf of the Government of the State as for example, the Railway Commissioners for New South Wales, the Sydney Harbour Trust, the Metropolitan Water, Sewerage and Drainage Board, the Water Conservation and Irrigation Commission, the Board of Fire Commissioners of New South Wales, the Metropolitan Meat Industry Board, or the Hunter District Board of Water Supply and Sewerage.

'*Worker*' means any person who has entered into or works under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise, and whether the contract is expressed or implied, is oral or in writing, but does not include :—

(a) any person employed otherwise than by way of manual labour whose remuneration exceeds seven hundred and fifty pounds per year ; or

(b) an outworker ; or

(c) a member of the police force ; or

(d) a person whose employment is casual and who is employed otherwise than for the purposes of the employer's trade or business."

" 3. (a) Where any person (in this subsection referred to as the principal) in the course of or for the purposes of his trade or business contracts with any other person (in this section referred to as the contractor) for the execution by or under the contractor of the whole or any part of any work undertaken by the principal, the principal shall be liable to pay to any worker employed in the execution of the work any compensation under this Act which he would have been liable to pay if that worker had been immediately employed by him ; and where compensation is claimed from or proceedings are taken against the principal, then, in the application of this Act, reference to the principal shall be substituted for reference to the employer, except that the amount of compensation shall be calculated with reference to the earnings of the worker under the employer by whom he is immediately employed : Provided that, where the contract relates to threshing, ploughing, or other agricultural work, and the contractor provides and uses machinery driven by mechanical power for the purposes of such work, he and he alone shall be liable under this Act to pay compensation to any worker employed by him on such work.

(b) Where the principal is liable to pay compensation under this subsection, he shall be entitled to be indemnified by any person who would have been liable to pay compensation to the worker independently of this subsection and all questions as to the right to and amount of any such indemnity shall in default of agreement be settled by the Commission under this Act.

(c) Nothing in this subsection shall be construed as preventing a worker recovering compensation under this Act from the contractor instead of the principal.

(d) This subsection shall not apply in any case where the injury occurred elsewhere than on, or in, or about premises on which the principal has undertaken to execute the work or which otherwise are under the control or management: Provided that nothing in this paragraph shall affect the liability of the contractor under any other provisions of this Act."

"5. (a) Where any person (in this paragraph referred to as 'the principal') in the course of or for the purposes of his trade or business enters into a contract with any other person or persons (in this paragraph referred to as 'the contractor') under which the contractor agrees:—

(i) to supply timber and such timber is obtained or to be obtained from trees felled or to be felled by the contractor or his wages-men (whether such trees are the property of the principal or the contractor or any other person); or

(ii) to fell or ringbark trees or cut scrub or haul or load timber or haul and load timber; or

(iii) to clear land of stumps or logs; or

(iv) to cut sugar-cane; or

(v) to perform any other work or class of work specified by proclamation of the Governor and published in the Gazette;

and the contractor does not either sublet the contract or employ workers, or, though employing workers, actually performs any part of the work himself, the contractor and any worker so employed shall, for the purposes of this Act, be deemed to be workers employed by the principal.

(b) Where any person (in this paragraph referred to as the principal) advertises or otherwise notifies that he will accept timber delivered or supplied to him or his agent or other person in accordance with such advertisement or notification, or advertises or otherwise notifies to the above mentioned effect, any person who gives notice to such principal that he will deliver or supply such timber or any part thereof, and receives injury while engaged in or about the work of cutting, delivering, or supplying the said timber or any part thereof shall be deemed to be a worker employed by the principal.

Notice of intention to deliver or supply timber as aforesaid shall indicate the nature of the actual work to be undertaken and the time within which it will be performed. The notice shall be given prior to injury and may be given personally or by letter posted to the principal at his place of business or usual address.

'Timber' includes sleepers, piles, poles, girders, logs, or pit timber.

'Cutting' includes felling, sawing, obtaining, preparing, or doing any work in connection with timber, and 'cut' has a corresponding meaning."

Among the many general and miscellaneous provisions in the Act employers should note their obligation to keep posted in a conspicuous position in the place of employment a summary of the requirements of the Act with regard to the giving of notice of injuries and the making of claims by workers.

Payment of Smaller Sum "in settlement" of Debt.

It is well established (though commonly overlooked by business men) that a *mere cash payment* in lieu of a larger sum actually owing, though accepted in satisfaction by the creditor, does not in law discharge the debtor, there being in such case no "consideration" for the creditor's promise not to ask for the balance, and hence no contract enforceable at law (Co. Litt. 212b); *Cumber* v. *Wane*, 1 Str. 426; *Foakes* v. *Beer*, H.L. 9 App. Cases 605).

But it is otherwise if the larger sum claimed be *in dispute*, and the smaller sum is accepted in consideration of the settlement of the dispute as to the amount of the debtor's liability, thus avoiding legal proceedings; or if the settlement (as commonly done with a body of creditors) is *by deed*, which of itself imports a consideration. And an offer by the creditor to "take a cheque" (or other negotiable instrument) for the smaller sum, in settlement of his claim, also imports a new consideration, the debtor's only obligation being to pay in cash; and such offer, if acted on by the debtor, operates to make a legal contract discharging the debt (*Solree* v. *Tripp* [1846] 15 M. & W. 23)

After six years any claim for the balance, if it has not been enforced by the creditor, will be barred by the Statute of Limitations. But the effect of the statute may be avoided by a subsequent acknowledgment of the debt.

Proffer of Cheque "in settlement."

When a cheque is sent by a debtor with an intimation that it is sent "in settlement" of a claim, it is a mistake to suppose that the creditor must return the cheque if he maintains that a larger amount is due to him. In two cases that went to the Court of Appeal, the defendant in each case had sent to the plaintiff a cheque for a smaller amount than was claimed, stating that it was intended to be "in settlement." The plaintiffs, however, both replied that they accepted the cheques "on account"; and in each case it was held that the plaintiff was not precluded from suing for the balance of his claim (*Miller* v. *Davies*, 59 L.J.R.Q.B. 293; *Day* v. *M'Lea*, L.R. 22 Q.B.D. 610, 612).

If, after a proper tender of an amount "in settlement," and the refusal by the creditor to accept such amount on account, the creditor should sue the debtor for the full amount claimed by him, he will (if successful) "recover" in the action only the amount on which he and the debtor have been at issue, and will be entitled to no more costs than are allowable on an action for the disputed amount (*James* v. *Vane*, 2 E. & E. 883; 29 L.J.Q.B. 169).

Payment of Wages—Truck Act.

By the Truck Act of 1900 it is required that wages of workmen be paid in money, it being made illegal by the Acts to pay wages in goods, or to make any agreement to set off as wages the price of articles supplied; or for the employer to impose any condition, express or implied, as to the person, time, or place with whom, or when, or where, a workman's wages or any portion thereof are to be expended. No deduction may be made from a workman's wages for sharpening or repairing tools, except by agreement not forming part of the conditions of hiring; and when part of a workman's wages is—by agreement, custom, or otherwise—payable in advance, the employer is expressly forbidden by the Act to make any deduction for interest or poundage.

A deduction from the wages of a workman for a subscription to a sick club is illegal under the Truck Acts, but in a case where a workwoman had acquiesced in the payment out of her wages of such a subscription, the Court of Appeal held (1892) that she was debarred from recovering back the amounts so paid the fund to which they were paid not being an unlawful one (*Hewlett* v. *Allen*, Weekly Notes, 139; see also *Ex parte Cooper*, 26 Ch. D. 693).

By the Liquor Act 1898 the payment of wages in any public-house is prohibited, except by the resident owner or occupier of a public-house, beershop, &c., to workmen *bona-fide* employed by him.

Any employer infringing the Truck Act renders himself liable for a first offence to a penalty not exceeding £10; for a second offence, not exceeding £25; and for a third offence the offender may be fined any sum not exceeding £50. Penalties are recoverable before two justices

Commonwealth Industrial Arbitration Act, 1912, amended 1918, states: "That any person who enters into a contract with a contractor for the carrying out of any work involving the payment of wages shall be liable for the payment of such wages unless upon final payment made by him to the contractor in relation to the contract, he receives a statement in writing signed by the contractor that no wages are due and owing by the contractor in respect of the work at the time of such payment. Any person who knowingly makes or signs a false statement that no wages are due or owing by him in respect of any work shall be liable to a penalty of £100 or up to six months' imprisonment."

BUILDING MATERIALS OF NEW SOUTH WALES.

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Extracts from "Prize Essay on Economical Manufacturers" by C. MAYES, C.E., obtained at the Public Libraries, Melbourne, and Sydney.

Asbestos.—This valuable material may now be reckoned in building materials, as it is used largely in the making of walling sheets and slates for roofs. It is stated that a find of asbestos has been made at Euchareena, between Wellington and Orange. The lode is said to be 70 ft. wide. Large recoveries of asbestos lately found at MacDonald Ranges, Northern Territory, Queensland, 1925.

Basalt or Bluestone and Diorite.—Although not plentiful near Sydney, is generally distributed throughout the eastern half of the colony, and is well adapted for road metal, curbing and channelling, tar, concrete, &c. It will be found at or near the following towns south of Sydney:—**Camden, Campbelltown, Berrima,** Nattai, Robertson, Murrimba, Wollondilly, and **Cookbundoon** Rivers; Pomeroy, near **Goulburn, Crookwell, Boorowa, Gundagai, Coolac**; near Tumut, **Adelong,** Tumberumba, Yarrangobi, **Kiandra,** Seymour, **Cooma, Cathcart,** and Wyndham, near **Bombala,** near **Bega,** near Moruya, **Jervis Bay, Farnham, Kiama, Jamberoo,** Macquarie Rivulet near **Lake Illawarra, Hornsby** and Pennant Hills, near Sydney. Two of the finest blue metal quarries were opened in the districts of Mittagong and Hornsby.

Kiama.—Large quantities of blue metal are obtained from **Kiama,**

To the west of Sydney, basalt is found near Liverpool and Richmond, at **Emu Plains** near **Penrith,** at Rockley, Rydal, Mount Victoria, near **Bathurst, Blayney, Frederic,** Orange, **the Canoblas, Currajong,** near Parkes, and **Lake Cudjullagong,** on the Lachlan River.

To the north-west it is found at Hill End and Tamberoora, Hargreaves, Sofala, Newrea, Wellington, Mudgee, Dubbo and Rylstone, also at Crete, Grestore, Muswellbrook, Scone, Murrurundi, Wallabadah, Doughboy Hollow, north-west of Coonabarabran.

To the north it is found near Gloucester, near Stroud, on the Hastings River, near Port Macquarie, West Kempsey, Nundle, Tamworth near Walcha, near Armidale, Uralla, Falconer, Glen Innes, near Newtown, Boyd, near Gordon and Tabulam on the Clarence River, Lismore, &c., on the Richmond River, the Tweed River, also at Deepwater on the Severn Rivers, Wellingrove, Byron, Inverell, &c.

BRICKS.

Fire Clay and superior bricks are made at Enfield, St. Peters, Liverpool, Lithgow Valley, Brisbane Water, Wollongong, Mudgee, Wallerawang, Bulli, Granville, Yass, Bathurst, Dapto, Tamworth, Armidale, Broken Hill, Albury, Vegetable Creek, &c., and may be looked for generally on the coal measures and the country between Berrima and the Hawkesbury River.

GRANITE.

Granite is found at Tamworth, Trial Bay, Gabo Island, Moruya, &c. The polished granite columns of the Post-office at Sydney are Moruya granite. Slabs for facing concrete structures in Sydney, North Shore Bridge, facing stones for piers and approaches, 1925.

A **finer grained granite** has also been procured from Montague Island, about 20 miles south of Moruya. Blocks of granite, weighing 16 tons, were brought from the above localities and used in the General Post Office, Sydney.

A **light red granite** is found at Trial Bay, and used there in the erection of a lighthouse, &c.

GYPSUM.

Gypsum (*sulphate of lime*) crystallised and amorphous or lumpy, is found in large quantities near Mount Browne goldfields, Balranald. As before stated, it is easily burnt into plaster of Paris, as limestone is burnt into lime.

Limestone, dense blue, from Port Stephens; cream colour, with brown veins, from Mudgee.

From the Mineral Statistics of New South Wales, I find that a grey crystalline limestone is found near Wollongong, containing:—Carbonate of lime, 74.3; carbonate of magnesia, 0.8; alumina, 7.3; oxide of iron, 3.1; phosphoric oxide, 0.4; silica, 10.7; organic matter and water, 3.4. This limestone when burnt gives a brownish hydraulic lime.

Mountain Limestone.—The Fish River, Jenolan Caves, Yarrangobilli Caves, Wellington Caves, and Cavan Caves, near Yass, are in this formation.

Limestone is also found at Kempsey, Nundle, Murrurundi, Scone, Copeland, Dubbo, Wyndeyer, Ironbarks, Parkes, Forbes, Orange, Cow Flat, Caloola, Tuenna, near Junee, Jugiong, Yass, Goulburn, Gundagai, Adelong, Kiandra, Braidwood, Wingham, Gloucester, Stroud, Ophir, Wallerawang, Rockley, Bookham, Queanbeyan, Bombala, &c., being most prevalent in the silurian or goldfields formation, and extensive lime kilns have been erected at Marulan, Bowning, near Yass, and Piper's Flat.

MARBLE.

Some of the **finest** and **soundest** marbles in the world are found in New South Wales, coming from the district of Orange and Bathurst. The quarries at Caloola Creek, near Newbridge, **Borenore,** and **Fernbrook,** produce coloured marble of great beauty, and white marble of great purity. The base of Queen Victoria's Memorial statue in Melbourne is of this Caloola marble. Her Majesty's Theatre, Sydney, staircase, Stanway house, Prince Edward Theatre, &c., and many other offices and banks, are from **Borenore,** and in colour are Rouge, Breccii, and St. Annes.

Queen Alexandra Rouge and variageted, and marbles most brilliant in tones, are found there.

There is also good red and **white** narble at Tamworth, and **black marble** at Bibbenluke.

Marulan Marble.—White, grey, reddish purple, and black.

Cow Flat marble is white, and was used with the black marble from Marulan in flooring the great hall of the Sydney University and Public Library stair-landings.

Wallerawang Marble (white, cream and dove colour), can be obtained of any size. The quarries are seven miles from Wallerawang railway station. The Kandos Portland cement works are in that district.

FREESTONE.

Sandstone (free), suitable for building and grindstones, is quarried in Sydney and suburbs, Manly, Brisbane Water, Lithgow Valley. These latter are from the same geological formation as the coal measures, and therefore similar to the Sydney (free) sandstone so largely used in the best buildings of Sydney, &c.

Sandstone, varying greatly in hardness and cost of dressing, is obtained even from Pyrmont, Sydney. Ordinary free sandstones are also quarried at Randwick, Mosman's Bay, North Shore, Hunter's Hill, Parramatta, Waverley, and along the Illawarra line.

Pyrmont sandstone, from the **lower** beds, of yellow colour, fine grained, withstood a pressure by Professor Warren when applied to 3 inch cubes of 39,000lbs., and to 4 inch cubes of 100,000lbs. An equal sided cube foot sustained a pressure for 20 minutes of 200 tons when tested.

Good Sandstone, suitable for building, is also found at Maroubra State Quarries, Hawbeskury sandstone, now used for light grey **facings** to concrete buildings, East Maitland, Morpeth, Clarence Town, Muswellbrook, Rutherford, and Ravensfield. All these are similar to the Sydney sandstone, and generally of a creamy or sienna colour. At Paterson, on the Hunter River, it is of a greenish tinge, and at Wollombi of a pink and light brown tint.

Sandstone (*Silurian*), from Albury and Mudgee, Houlburn, Bukingbong, and Narrandera. These sandstones are harder and in smaller beds than those from the coal measures, and may be looked for on all the goldfields. They are not so good for building blocks, being strongly laminated.

Grey Stone is found at Molong and Orange, in level beds, and is good for flagging, steps and sills having been used in Government buildings there.

The **price** for **clean chiselling,** this stone, or viz., sawn by machinery, is 2/6 per super. foot.

SLATE.

Silurian or goldfields formation.—A third class slate, from Kerraway, near Goulburn, also at Cookbundoon.

South Gundagai Slate.—A superior kind of slate is found here.

At Millamurrah, near Bathurst, roof, slates were taken out.

TERRA COTTA.

Terra Cotta of a superior class is made at the Sydney potteries, Enfield, Camperdown, Granville, Liverpool, St. Peters; also at Lithgow Valley and Albury, &c.

TRACHYTE.

Is found at Mittagong and Bowral, and is used in the railway bridge over the Hawkesbury River, to resist decay from sea water.

Trachyte, light blue, from Bowral, Mittagong and Clarence Town, It has been used in Government and many other buildings in Sydney, and where strength, density is required, takes a high lasting polish.

The **cost of working** is between bluestone and Adelaide marble or Moruya granite. (See stonecutting.)

BUILDING MATERIALS OF VICTORIA.

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Basalt or Bluestone, of volcanic or igneous origin, and forms some of the largest plains of Australia, is found near Melbourne, although very durable, it is not used where a light appearance or architectural effect is required. It is well adapted for foundations, basements, &c.

Bricks, etc.—In consequence of the absence of good freestone in Melbourne, the manufacture of ornamental bricks is a fine art, and good brick architecture has resulted.

Tiles. are made by the Australian Tesselate Tile Co., of Melbourne, and T.C. Faience Tiles by Wunderlich & Co.

GRANITES.

A first-class **Grey and Cream colour** Granite is found at Beechworth.

Grey granite is found at **Sandhurst, Mount Alexander, Harcourt.** The latter is the finest and best. It is made into columns, polished, and exported.

Granite is also obtained from Mount Eliza, Mount Martha, Palenty Ranges, Mount Backwood, Refuge Cove, Gabo Island, &c. The latter granite is probably the hardest and most durable.

SANDSTONE.

Sandstone, suitable for building, is obtained from the various goldfields, but it is generally very hard, laminated, and often micaceous, and is therefore better adapted for flagging or flat-bedded rubble. A soft sandstone was obtained at Bacchus Marsh and Darley. Both these free sandstones are too soft and friable for permanent buildings.

Stawell Free Sandstone is obtained from the Grampian Hills, about eighteen miles from Stawell. It is a fine close-grained heavy sandstone, and apparently of a durable quality; but its appearance in the above building is greatly marred by particles of ironstone thinly interspersed, which, when exposed to the weather, disintegrate or waste away, running down the face of the stone and staining it. This stone is used for third storey to the General Post Office, Melbourne.

The **cost of working** the Stawell sandstone is about 50 per cent. more than the Tasmanian freestone.

Barrabool Hill Free Sandstone is found near Geelong, and has been largely used there, and in building St. Paul's Cathedral, Melbourne.

SLATE.

Slate is found in many parts of Victoria.

Castlemaine Slate is equal, on the whole, to the Welsh slate. It is said to be much stronger than sawn bluestones.

LIMESTONES.

Limestones suitable for building are found at Waurn Ponds near Geelong; it is much cheaper than the Oamaru free limestone.

Portland, Warrnambool and Malmsbury Limestones are granulated and porous; they are used for building-stone or burnt into lime.

Recent or Tertiary Limestone is found throughout the north-western portions of the colony, between the settled districts and the Murray River on the north, extending into South Australia on the west. It is also found at Benalla and the Delegate River or near the coast limestone is found at Belfast, Cape Otway, Western Port, Cape Patterson, Cape Liptrap, Lake Victoria, and Ninety-mile Beach.

Hydraulic Lime is made at Limestone Creek, near Guildford, and Bacchus Marsh. The Collingwood or Fitzroy limestone contains 52 per cent. carb. of lime; 18 pe 1cent. carb. of magnesia; 12 per cent. alumina; and 18 per cent. hydraulic silica.

The lime is said to be similar in appearance and properties to the noted Blue Lias lime.

Septaria, in the form of white and grey cement stones, are obtained at Spring Creek, 15 miles from Geelong.

QUEENSLAND BUILDING MATERIALS.

GIVING THE LOCALITY WHERE OBTAINED OR MANUFACTURED.

Freestone.—*Sandstone and Fire-clay* will be found in all the Coal fields of Queensland, the dip is flat and never exceeds 30 degrees.

Breakfast Creek quarry, about 3½ miles from Brisbane, has supplied most of the stone used in Brisbane, and is the stone quoted in my price list. It is durable, fine grained, and of a suitable colour.

The sandstone found near Brisbane and in the southern districts of Queensland belongs to the coal measures, and has its prototype in Sydney and suburbs. The **cost of working** is also the **same.**

Goodna, on the Brisbane River, abounds in good sandstone quarries from which the sandstone for the Parliament House, Government House and Town Hall were obtained.

Grantham.—First-class sandstone is found varying in colour from white to brown. It was used in the Government Printing Office, Brisbane, and is also used for grindstones.

Helidon.—A good, hard and durable sandstone which varies much in colour (white, brown and liver), the liver and brown coloured stone being very durable. The Custom House and National Bank, Brisbane, are built of this stone.

Highfield quarries, the stone was used in Treasury Buildings.

Ipswich Coal Measures.—The coal measures also produce fine brick earth or shales from which the best bricks, tiles and terra cotta are made. The coal measures are also found at Maryborough, Rockhampton, Warwick, West Moreton, and Brisbane.

Murphy's Creek quarries yield good stone, similar to that found near Goodna.

Mogul, 4 miles from Goona, good sandstone, with very fine black specks, of no detriment to its appearance or durability. It can be obtained of any size up to 50 tons.

Warwick Railway Station and Town Hall are built with sandstone from Mount Storat quarry. Hospital is built of that stone.

Granite.—At Gilbert goldfields **red granite** is found.

Ravenswood, green granite and **Statuary marble.**

Broken River.—Tropical Queensland. Black fossil marble, also **basalt** or **bluestone.**

Gladstone variegated marble (marble front).

Calliope River.—Rose, Black, white, yellow, and other marbles.

Rockhampton.—Variegated marbles from quarry, Northumberland Group; also from Percy and other islands on the Queensland coast.

Warwick.—Black and **white statuary** marbles.

Porphyry.—This is a peculiar conglomerate of primitive rocks of all tints, pink predominating. It is used in Brisbane for the bases of buildings, kerbing, channelling, and metalling the streets, &c. The R.C. Church is wholly built of it; the Normal School also, with sandstone dressings to openings. It is much harder than the freestone, but not so hard or costly to work as the Melbourne bluestone.

TIMBER TREES OF QUEENSLAND.

The Queensland Maple, also called silkwood or red beech, is a light coloured timber; grows principally north of Townsville, 50 or 60 miles inland along the coast line, and is a very sound wood, available in large sizes. The tree grows up to 20 feet girth. It is the fancy wood of Queensland (1914), and is suitable for furniture, shop and office fittings, and is now extensively used in superior work, taking the place of cedar in joinery in all the Australian States.

The Government are using it for railway and tram car interior and construction.

Moreton Bay Ash (*Euc. tesselaris*).—Diam., 14 to 25 inches; height, 30 to 60 feet. Timber of a brownish colour, not hard, but tough; it is found north and south in the colony.

Moreton Bay Pine (*Araucaria*).—Diam., 30 to 60 inch; height, 150 to 200 feet. The timber is used extensively in this colony. The wood is strong and durable when kept dry, but soon decays when alternately damp and dry. When procured from the mountains of the interior it is fine-grained, and is susceptible to a high polish.

Peppermint of Tuepentine Tree (*Euc. microcorys*).—Diam., 18 to 36 inches; height, 60 to 80 feet. Timber strong and durable.

Red Gum (*Euc. terreticornis*).—Diam., 18 to 36 inches; height, 60 to 90 feet. Used in fencing, building, plough-beams, poles, and shafts of drays, and also in ship-building.

She Oak, River (*Cas. glauca*).—Diam., 24 to 36 inches; height, 70 to 90 feet. A robust tree, and grows on the borders of rivers and creeks. The timber is strong and tough, used for staves, shingles, &c.

Spotted Gum (*Euc. maculata*).—Diam., 20 to 36 inches; height, 60 to 80 feet. It is a very valuable timber, on account of its strength and elasticity; used for buggy shafts, cogs of wheels, &c. In bridge-building it is used for tie-beams, &c., and is found to have the highest constant strength of any of the Queensland timbers.

WHARF-PILE TIMBERS.

Queensland abounds in valuable timbers of over forty different varieties. Cypress Pine, She-ash, Swamp Mahogany, Turpentine, and Ironbark are the most suitable for piles for wharfs and tidal river bridges. Experiments conducted with Moreton Bay Pine, Blue Gum, Spotted Gum, Swamp Mahogany, and She-ash showed that only two of the above resisted the ravages of cobra also Swamp Mahogany and She-ash. The other woods succumbed to the destructive worm.

SOUTH AUSTRALIAN BUILDING MATERIALS.

See Other Building Materials, page 201.

DOLOMITE.

Dolomite, or Magnesian Limestone, is a first-class building stone, but the great cost of working it with edged tools will prevent its being used except as rubble. If dolomite contains over 5 per cent. of alumina, it makes an excellent hydraulic lime.

GYPSUM.

In nodules and crystals, is found in Yorketown and burnt into Plaster of Paris.

LIMESTONE.

Tertiary is largely distributed over the State in the form of soft freestone, very much like the Oamaru freestone of New Zealand. The yellow limestone from Murray bridge contains minute small shells; is used in public buildings of Adelaide, and looks like Sydney freestone, 13 c. ft. per ton.

Parrawilla Limestone is extensively found on the southern sea coast; of a salmon tint, it is soft, and easily cut with a knife.

Manoora, Teatree Gully, etc.—Yield abundance of freestone. Excellent blocks of even quality can be procured up to ten tons weight. This stone has been used for the University in many colours, white and buff. Weight about 138lbs. per cube foot, or 16¼ feet per ton.

Freestone.—This is another name given to those soft portions of the above limestones that are suitable for building. Quarries south-east of the colony, are at the Hanging Rocks, Mount Gambier district, &c. Like Oamaru stone, it extends from the Gawler Plains to Mount Gambier.

Marble.—From Rapid Bay, first-class

Kapunda Marble was used for facing the new Parliament Houses at Adelaide.

White Marble, from Macclesfield, Angaston, &c. The great cost of working this and other marbles would preclude them coming into

general use, except for ashlaring cemeteries, monuments, mantels, slabs, &c.

Slate.—Good roofing slates are obtained at the Willunga quarries, and **Slate Slabs** at Mintaro.

TASMANIAN BUILDING MATERIALS.

CEMENT.

Maria Island Cement.—The **natural cement stone** forming the cliffs, 200 to 1500 feet high make excellent cement.

Bricks.—Fire-clay, Pottery-clay, Fire-bricks, Paving Tiles, and Terra Cotta, etc., can be obtained from Seymour, &c.

Freestone (Sandstone).—Good building, from Teatree, 21 miles from Hobart; also from Lindisfern and Mona Vale; all being similar to the Point Bentenet and Spring Bay sandstone. Freestone from Knocklofty is of a brown tinge.

Granite is found on the north-east coast of Tasmania.

Limestone and **Marble** is found near Beaconsfield, the River Tamar, and near New Norfolk.

A large portion of the lime made near Hobart and the Don River is more or less **hydraulic,** and well adapted for concrete. As it is liable to fire when slacking, it cannot be exported as quick or fresh lime.

Blackwood, one of the finest cabinet-woods in Tasmania; also used for wheels, casks, carriages, and railway trucks; colour of a light walnut; maximum height, 130 feet, and diam. 4 to 6 feet.

Blue Gum (*Eucalyptus globulus*), so called by Labillardiere, who discovered it in Tasmania, in 1792. The leaves when young are of a bluish green and nearly round; they afterwards become long and narrow, of a sea-green colour, and very fragrant, producing small white fragrant flowers. The wood when mature is hard, dense, and durable.

Eucalyptus piperita is another descrpition of blue gum largely used for ship-building.

Celery Top Pine grows as large as the Myrtle. It is straight-grained, and makes good flooring boards, as it does not shrink much.

He Oak, or Swamp Oak.—Coarse-grained, light, and tough, and beautifully marked for furniture making.

Huon Pine, like bird's-eye maple, used for panels of doors, &c., and for cabinet work. It is found at Port Macquarie, Port Davy, Pieman River, and on the western coast generally.

King William, or Forth Pine, up to 12ft. girt, is found at the head of the Forth River.

Myrtle, or Tasmanian Beech.—Colour, yellowish pink, highly ornamental cabinet wood; maximum height, 200 feet, and diam., 12 feet. It is used for flooring boards, carpentry, and is said to resist the *cobra*.

Peppermint (*Eucalyptus amygdalina*).—This is a superior wood for piles, and is said to resist the attacks of the cobra.

Red or Pencil Pine, from near the source of the River Forth.

NEW ZEALAND BUILDING MATERIALS.

Oamaru Free Limestone.—Is a white granular limestone. Uniform of colour and texture, and can be obtained in large blocks. It is quite soft when quarried, but hardens rapidly on exposure to a dry atmosphere. This enables it to be worked into most elaborate ornamentation at little cost.

The durability of the Oamaru stone, its resistance to the disintegrating action of sulphate of soda is comparatively feeble.

The Bank of Australasia and Imperial Insurance Offices, in Melbourne, are built with this stone: also ornamented stone steeple and church, Bondi, Sydney, 1880 to 1927.

Trachyte is a fine grey stone, found at Port Chalmers, and used in the construction of the Graving Dock there. It is said not to cost so much as Bluestone to work. It resists the action of fire, and is used for building lime-kilns in Otago.

Kauri (*Dammara Australis*) (Lambert).—The Kauri is the finest forest tree in New Zealand, and attains a height of 120 to 160 feet. The trunk is sometimes 80 to 100 feet high before branching, and attains a diameter at the base of 10 to 20 feet, but is now getting scarce.

But, unlike them it shrinks lengthwise when unseasoned. It occurs only in the North Island, and north of Mercury Bay, and grows best near the sea, on wet clay land.

The turpentine of this tree forms the celebrated Kauri gum, which is extensively excavated from the sides of old forests as far south as Taranaki. Kauri was used in the construction of the Queen's Wharf, Auckland, and after 23 years, the sea-worms had eaten only the sap-wood of the young timber.

Kauri pine has been proved one of the best soft wood timbers of the world, being harder than Baltic deal, and entirely free from knots.

MEASUREMENTS AND WEIGHTS OF COINS.

A bronze halfpenny measures exactly 1 inch in diameter—5 equal 1oz.
1 bronze penny measures exactly 1.2 inch in diameter 3 „ „
A florin and a sixpence weigh $\frac{1}{2}$ an ounce.

Term penny as applied to nails—
Three penny means 3 pounds to 1000 nails.
Eight penny means 8 pounds to 1000 nails.

The diameter of a circle multiplied by .8862 equals side of equal square in area.

The diameter of a circle multiplied by .7071 equals diameter inscribed square in circle.

The side of a square multiplied by 3.545 equals circumference of a circle of equal area.

The circumference of a circle multiplied by .2821 equals side of a square of equal area.

The diameter of a circle divided by 3.1416 equals circumference.

HINTS ON RECKONING.

Given the price per ton to find value of more or less weight.

Reckon the tons as pounds, cwts., as shillings, each quarter as 3d., and 9lbs. as 1d.

USEFUL TABLES AND MEMORANDA.

LIFTING A STONE BUILDING.

As an example of what can be done in the direction of **underpinning**, the alteration recently made to a two-storey **masonry structure** in Illinois (says the London *Builder*) is decidedly worthy of attention.

The building, used as a county courthouse, covers an area of nearly 10,000 square feet, the walls are about 60ft. high, and the roof is surmounted by a heavy dome. For the purpose of forming a new lower storey, the entire structure was raised bodily by more than 12ft.

The mode of operation seems to have been particularly simple, and was as follows :—

Rectangular holes at short intervals were cut through all the outer and two cross walls, about 3ft. above the ground level.

Two or three 15in. steel I-beams were then inserted in each hole, the ends being supported on 12in. square timbers parallel with the walls.

The timbers in turn were set on 10-ton screw-jacks resting upon two 12in. square sills.

By the aid of a large gang of men the jacks were screwed up gradually until the whole building had been lifted 6in., when the load was transferred to timber beams placed on each side of the walls, these beams being shored up whilst cribwork was built beneath the jacks so that the next lift might be made.

When the structure had been raised 2ft. the old foundations were taken away, and a third crib was added and continuously built up as the work progressed.

Finally the centre crib was removed, and in its place new foundations were formed, and new walls were carried up to the old work.

Each front of the building includes a massive portico, having four stone columns, each weighing about 50 tons. These porticos were raised together with the main walls by using longer steel beams at the necessary points. It is said that the work was successfully accomplished without cracking the masonry or causing any other structural injury.

REMOVING RUST FROM IRON.

May easily be effected by immersing the article in a nearly saturated solution of chloride of tin, even if much eaten into. The duration of the immersion will depend upon the thicker or thinner film of rust ; in most cases, however, 12 to 24 hours will suffice. The solution of chloride of tin must not contain too great an excess of acid, otherwise it will attack the iron itself. After the articles have been removed from the bath, they should first be washed in water, and then with ammonia, and be dried as quickly as possible. Articles treated in this manner assume the appearance of dead silver.

Prevent Lead from spluttering in leading iron pallisading into stone.—Drop oil into hole or mould.

To test Iron or Steel.—A drop of nitric acid turns iron white and steel black.

Flux for Soldering Zinc.—Dissolve small pieces of zinc in muriatic acid, with water, double quantity.

To toughen Plaster Casts and prevent cracking, saturate them in hot glue and water—1 to 5.

Never use Tarred Paper under a tin roof. The acid in the tar destroys the metal.

Place thick paper under tin to prevent damage when laid on concrete.

To hang a door that will rise as it opens and also shut itself unaided, use a wider butt hing eat bottom than top ofdoor.

To **Underpin Super-structure of Building** for Insertion of Rolled Steel Joists or Girders.—Above the proposed girder position make holes through wall at most solid portions, such as between windows or openings above, sufficient only to insert cross girders, of steel preferred. Support these each on timber or steel uprights, leaving sufficient room for insertion and working of proposed girders between the rows of uprights. Raise uprights to required height by "fox-tail" wedges inserted at bottom, and staying uprights if necessary. When the weight is taken, carefully remove the building material, of stone or brick.

Place your bearer in position with ends secured, then, build in with cement and iron wedges driven above girder till the whole length is solidly resting on girder, and properly set and dry; then remove under-pinning timbers and cross girders, the holes being built up solid.

Simple method of framing for concrete **kerbs and gutters** is with 9in. x 3in. Oregon on each side of kerbs, the gutters being made after the 9in. x 3in. being placed on its flat for boundary and levels.

Concrete bressemers over openings are made by upright supports, one each side of wall, with cross-pieces nailed underneath, allowing for thickness of planking, at sides and bed. The planks are easily released when concrete is dry by simply knocking loose the cross-pieces.

MENSURATION OF SURFACES AND VOLUMES.

Area of rectangle = length x breadth.

Area of triangle = base x half perpendicular height.

Diameter of circle = radius x 2 = circumference x 0.31831.

Circumference of circle = diameter x 3.1416.

Area of circle = square of diamater x 7854.

Area of surface of cylinder = circumference x length plus area of two ends.

To find diameter of circle having given area: Divide the area by 7854 and extract the square root.

To find the volume of a cylinder: Multiply the area of the section in square inches by the length in inches = the volume in cubic inches. Cubic inches divided by 1728 = volume in cubic feet.

Surface of a sphere = square of diameter x 3.1416.

Volume of a sphere = cube of diameter x .5236.

Side of an inscribed cube = radius of a sphere x 1.1547.

Area of the base of a pyramid or cone, whether round, square, or triangular, multiplied by one-third of its height = the volume.

To find area of a circle multiply square of diameter by .7854.

To find diameter of a circle multiply circumference by .31831.

To find circumference of a circle multiply diameter by 3.1416.

BRITISH WEIGHTS AND MEASURES.

Lineal measure.

7.92 inches	=	1 link.
12 inches	=	1 foot.
3 feet	=	1 yard.
6 feet	=	1 fathom.
5½ yards	=	1 rod, pole, or perch.
100 links	=	66 feet = 1 chain.
220 yards	=	40 poles = 10 chains = 1 furlong.
8 furlongs	=	80 chains = 1,760 yards = 5,280 feet = 1 mile
6,080 feet	=	1 Admiralty knot.

Square Measure.

144 square inches... ...	=	1 square foot.
9 square feet	=	1 square yard.
30¼ square yards	=	1 square pole, rod, or perch.
40 square poles	=	1 rood.
4 roods	=	4,840 square yards = 1 acre
640 acres	=	1 square mile.

Liquid Measure.

8.665 cubid inches ...	=	1 gill.
4 gills	=	1 pint.
2 pints	=	1 quart.
4 quarts	=	1 gallon.
1 gallon	=	277¼ cubic inches or 0.16 cubic foot
1 ,, ...	=	10lbs. of distilled water.
1 cubic foot ...	=	6.232 gallons.
1 cwt. water ...	=	1.8 cubic foot.
1 bushel	=	1.28 ,,

Avoirdupois Weight.

27.344 grains	=	1 drachm.
16 drachms	=	437½ grains = 1 ounce.
16 ounces	=	7,000 grains = 1 pound.
14 pounds	=	1 stone.
28 pounds	=	1 quarter.
4 quarters	=	112 pounds = 1 hundredweight.
20 hundredweight ...	=	2,240 pounds = 1 ton.

Troy Weight.

24 grains	=	1 pennywieght.
20 pennyweights ...	=	480 grains = 1 troy ounce.
12 troy ounces	=	5,760 grains = 1 troy pound.

Measures and their Square Dimensions.

		in.	in.	in.		in.	in.	in.
1 pint	=	4	x 4	x 2-1/10	31½ gals.—1 barrel			
1 quart	=	4	x 4	x 3-9/16		24	x 24	x 14.7
1 gallon	=	7	x 4	x 8½	½-bushel	12	x 11.2	x 8
10 gals.	=	14	x 15	x 11	1 bushel	12	x 11.2	x 16
5 bushels	=	24	x 28	x 16				

Metres and Feet.

1 metre	= 3ft 3.3704in.	1 foot	= .304 metres

THE HANDY READY RECKONER.

No.	1¼d.	1½d.	1¾d.	2d.	2¼d.	2½d.	2¾d.	3d.	3¼d.	3½d.	3¾d.	4d.	4¼d.	4½d.	4¾d.	5d.	5¼d.	5½d.	5¾d.
Art.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1	0 1¼	0 1½	0 1¾	0 2	0 2¼	0 2½	0 2¾	0 3	0 3¼	0 3½	0 3¾	0 4	0 4¼	0 4½	0 4¾	0 5	0 5¼	0 5½	0 5¾
2	0 2½	0 3	0 3½	0 4	0 4½	0 5	0 5½	0 6	0 6½	0 7	0 7½	0 8	0 8½	0 9	0 9½	0 10	0 10½	0 11	0 11½
3	0 3¾	0 4½	0 5¼	0 6	0 6¾	0 7½	0 8¼	0 9	0 9¾	0 10½	0 11¼	1 0	1 0¾	1 1½	1 2¼	1 3	1 3¾	1 4½	1 5¼
4	0 5	0 6	0 7	0 8	0 9	0 10	0 11	1 0	1 1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	1 10	1 11
5	0 6¼	0 7½	0 8¾	0 10	0 11¼	1 0½	1 1¾	1 3	1 4½	1 5½	1 6¾	1 8	1 9¼	1 10½	1 11¾	2 1	2 2¼	2 3½	2 4¾
6	0 7½	0 9	0 10½	1 0	1 1½	1 3	1 4½	1 6	1 7½	1 9	1 10½	2 0	2 1½	2 3	2 4½	2 6	2 7½	2 9	2 10½
7	0 8¾	0 10½	1 0¼	1 2	1 3¾	1 5½	1 7½	1 9	1 10¾	2 0½	2 2¼	2 4	2 5¾	2 7½	2 9¼	2 11	3 0¾	3 2½	3 4¼
8	0 10	1 1	0 2	1 4	1 6	1 8	1 10	2 0	2 2	2 4	2 6	2 8	2 10	3 0	3 2	3 4	3 6	3 8	3 10
9	0 11¼	1 1½	1 3¾	1 6	1 8¼	1 10½	2 0¾	2 3	2 5¼	2 7½	2 9¾	3 0	3 2¼	3 4½	3 6¾	3 9	3 11¼	4 1½	4 3¾
10	1 0½	1 3	1 5½	1 8	1 10½	2 1	2 3½	2 6	2 8½	2 11	3 1½	3 4	3 6½	3 9	3 11½	4 2	4 4⅛	4 7	4 9½
11	1 1¾	1 4½	1 7¼	1 10	2 0¾	2 3½	2 6¼	2 9	2 11¾	3 2½	3 5¼	3 8	3 10¾	4 1½	4 4¼	4 7	4 9¾	5 0½	5 3¼
12	1 3	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 6	3 9	4 0	4 3	4 6	4 9	5 0	5 3	5 6	5 9
13	1 4¼	1 7½	1 10¾	2 2	2 5¼	2 8½	2 11¾	3 3	3 6¼	3 9½	4 0¾	4 4	4 7¼	4 10½	5 1¾	5 5	5 8¼	5 11½	6 2¾
14	1 5½	1 9	2 0½	2 4	2 7½	2 11	3 2½	3 6	3 9½	4 1	4 4½	4 8	4 11½	5 3	5 6½	5 10	6 1½	6 5	6 8½
15	1 6¾	1 10½	2 2¼	2 6	2 9¾	3 1½	3 5¼	3 9	4 0¾	4 4½	4 8¼	5 0	5 3¾	5 7½	5 11¼	6 3	6 6¾	6 10½	7 2¼
16	1 8	2 0	2 4	2 8	3 0	3 4	3 8	4 0	4 4	4 8	5 0	5 4	5 8	6 0	6 4	6 8	7 0	7 4	7 8
17	1 9¼	2 1½	2 5¾	2 10	3 2¼	3 6½	3 10¾	4 3	4 7¼	4 11½	5 3¾	5 8	6 0¼	6 4½	6 8¾	7 1	7 5¼	7 9½	8 1¾
18	1 10½	2 3	2 7½	3 0	3 4½	3 9	4 1½	4 6	4 10½	5 3	5 7½	6 0	6 4½	6 9	7 1½	7 6	7 10½	8 3	8 7½
19	1 11¾	2 4½	2 9¼	3 2	3 6¾	3 11½	4 4¼	4 9	5 1¾	5 6½	5 11¼	6 4	6 8¾	7 1½	7 6¼	7 11	8 3¾	8 8½	8 11¼
20	2 1	2 6	2 11	3 4	3 9	4 2	4 7	5 0	5 5	5 10	6 3	6 8	7 1	7 6	7 11	8 4	8 9	9 2	9 7
21	2 2¼	2 7½	3 0¾	3 6	3 11¼	4 4½	4 9¾	5 3	5 8¼	6 1½	6 6¾	7 0	7 5¼	7 10½	8 3¾	8 9	9 2¼	9 7½	10 0¾
22	2 3½	2 9	3 2½	3 8	4 1¾	4 7	5 0¾	5 6	5 11½	6 5	6 10¾	7 4	7 9½	8 3	8 8¼	9 2	9 7½	10 1	10 6¾
23	2 4¾	2 10½	3 4¼	3 10	4 3¾	4 9½	5 3½	5 9	6 2¾	6 8½	7 2¼	7 8	8 1¾	8 7½	9 1¼	9 7	10 0¾	10 6½	11 0
24	2 6	3 0	3 6	4 0	4 6	5 0	5 6	6 0	6 6	7 0	7 6	8 0	8 6	9 0	9 6	10 0	10 6	11 0	11 5½
25	2 7½	3 1½	3 7¾	4 2	4 8¼	5 2½	5 8¾	6 3	6 9¼	7 3½	7 9¾	8 4	8 10¼	9 4⅛	9 10¾	10 5l	0 11½	11 5½	11 11⅝

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